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Symposium on Pain

Introduction by

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PART I

PAIN, since it is the principal warning symptom of disease, is of great diagnostic value. Furthermore, when recurrent and intractable, pain assumes the proportions of a disease entity in its own right and may present difficult problems of management. Thus, pain is of primary importance to all branches of medicine—to general physicians and specialists alike. In the development of the present symposium, therefore, care has been taken to cover the basic factual data and concepts of pain—neuroanatomic, neurophysiologic and psychologic. With this background, problems of pain as seen by certain representative clinical groups have been included. Clinical groups were selected that would bring out recent advances in this field and that would illustrate the more common and important types of pain of interest to all branches of medicine.

The second reason for the development of this symposium concerned the unique opportunity afforded us by our guest faculty and the presence in the University of California School of Medicine of the "Biomechanics Group," headed by Dr. Inman, which for several years has devoted itself to the fundamental aspects of pain. Professor Georg Schaltenbrand, recent winner of the highest honor in German neurology, the Erb Medal, and director of the Neurological Clinic at Wurzburg, participated in

the clinical portion, while H. Houston Merritt, professor of neurology at Columbia and also director of the Neurological Institute of New York City, and Dr. Arnold Friedman, chief of the Headache Unit of the Montefiore Hospital, participated in the portion of the symposium devoted to headache. All are recognized authorities on their subjects. Because of their fundamental contributions, few, if any, other groups would be better qualified to discuss the basic concepts of pain than the members of the "Biomechanics Group" selected for this purpose.

This symposium on pain thus has been a logical and timely development both from the standpoint of its desirability and the unique opportunity afforded us of doing it well.

Basic Concepts

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THE LITERATURE on pain is extensive and confusing, and I think one of the reasons is that pain, in itself, is not a discrete form of sensation as classically presented in the textbooks. To assume that pain is a sensation comparable to the other exteroceptive sensations seems to me to make the problem more difficult by over-simplification. For all sensations, except pain, the body has created certain end organs, or certain mechanisms, by which it can record or react to such specific stimuli as light, sound, touch, pressure, and temperature. These are physical phe-

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nomena, which can be recorded with accuracy by scientific instruments. This makes it possible to relate the objective stimuli to the subjective responses of the body.

This is not true of pain, which cannot be measured objectively and which exists only in the person experiencing it. Because of its subjectivity, one can only acquire a knowledge of pain through one's own sufferings or by communication with others. Often words are inadequate to express feelings or to describe accurately the sensations one feels. Because of the inability of words to express precise meanings and to create feelings, the investigation of pain is fraught with all the difficulties of communication.

A third difficulty arises if we fail to make a clear distinction between an individual's reaction to pain and the painful stimulus. It should be clearly understood that an individual's reaction to pain may be quite distinct from the sensation he is experiencing. While the perception of pain and the reaction to pain may be causally related, the individual's reaction to pain often appears to be quite out of proportion and independent of the magnitude of the painful stimulus.

In our own studies, we find that the same stimuli applied to the same tissues in different individuals may bring quite different reactions, varying all the way from mild protestations to complete vasomotor collapse. This difference was expressed very well by Wolff and Goodsell: "The age-old linkage between the perception of pain and the reaction to it has filled a vast literature on the subject, especially that based on animal experiments, with irrelevancies and contradictions. And since perceptions and reactions are not identical, their separation should be attempted in any study of pain, so that proper evaluation of experimental procedures will result, and obviously the reactions to pain belong perhaps to a great extent in the realm of psychiatry or psychological response, rather than in the field of pure laboratory experimental procedures carried out on pain."

The study of pain, therefore, is not a study of a simple sensation. Nevertheless, in spite of its difficulties and the confusion of the literature, it is an important field in which to pursue investigations. It is only through persistent effort and the accumulation of knowledge that we can hope to understand pain and eventually to alleviate some of the suffering that we see every day.

We will begin this symposium by presenting what is known concerning the neuroanatomy of pain. This will be followed by a consideration of some of the experimental work in the neurophysiological laboratories, and then a discussion of the psychological considerations of pain.

Neuroanatomical Considerations

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IN THE LAST CENTURY the Swedish physiologist Magnus Blix¹ was the first to investigate in a systematic way what we now call punctate sensation. Blix studied the effects of stimulating very small areas of the skin and showed fairly specific types of sensation localized in different areas. The sensations which can be produced by stimulation of the skin are commonly spoken of as the modalities of sensation. The classical modalities as described in every textbook of physiology are pain, cold, warmth and touch.

Blix's studies were greatly extended by the German physiologist von Frey.⁶ He developed a semi-quantitative method of studying the relationship between stimulus and sensation. The von Frey hair (esthesiometer) consists of a hair which has been calibrated in terms of the force necessary to produce a certain distortion of the hair. With such a hair, one can describe the force used in producing a certain cutaneous sensation.

In the course of time a variety of end-organs in the skin were described. These included such structures as the Meissner corpuscles, which were identified with touch; the Pacinian corpuscles, commonly thought of as giving rise to sensation of pressure; the Krause end-organs, identified with sensations of cold; the Ruffini end-organs, commonly associated with sensation of warmth; and so on. Although none of these end-organs specifically have been associated with the sensation of pain, it is highly probable that several, if not all, may mediate the sensation of pain if subjected to a sufficiently intense stimulation. The specialized end-organs frequently have a dual innervation, consisting of a primary nerve fiber and another nerve fiber of a smaller caliber, which is commonly associated with the transmission of pain. It is, therefore, likely, in some instances at least, that the pain elicited by intense stimulation of a specialized end-organ is simply due to the stimulation of the small accessory nerve fiber.

Unfortunately, cutaneous sensation appears to be much more complicated than the early physiologists supposed. There is a good deal of evidence to show that the different modalities of sensation do not correspond precisely with the particular types of end-organs as had been supposed.

Recently Sinclair and co-workers⁵ studied sensation in the skin of the human ear and showed that the usual sensations can be aroused by stimulating this area, but that histologically the skin of the ear

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contains none of the well-defined types of sense organs already mentioned. The skin of the ear does have a very rich innervation of small fibers with bare nerve endings, which presumably may mediate the various modalities of sensation present.

On the other hand, in other areas of the body the types of end-organs far exceed in number the types of sensation. This has been shown in experiments (described by Ruch as "heroic experiments") in which the prepuce was stretched and the sensory modalities studied and then compared with histological studies made upon similar skin. Seven or eight different kinds of well-defined end-organs were present, but only the usual four classical modalities of sensation. Why there should be such a great superfluity of these end-organs is perplexing.

Other difficulties complicate an understanding of sensation. One is concerned with the sensation of cold—so-called paradoxical cold. Cold receptors will fire over a range of about 25° to 32°C. and then will cease to fire above these temperatures, until a temperature of about 45°C. is reached, at which time another peak of activity of the cold receptor is attained. In other words, a cold receptor is an end-organ which will respond not only to temperatures below body temperature, but again to a temperature close to what can be tolerated and, in fact, close to the temperature that will result in destruction of the tissue if it is continued for long. Pain is also produced at about this same temperature. Thus, high temperatures may produce a simultaneous firing of receptors associated with the sensations of cold and pain. Obviously, then, the physiological factors which enter into the responses of end-organs may be very complicated. It is impossible to lay down any simple rule governing the relationship between a particular sensation and a particular sense organ.

The role played by small nerve fibers, now commonly associated with the sensation of pain, was not understood until the second and third decades of this century. The American anatomist, Ranson, made the first great studies on the distribution of small nerve fibers. Ranson⁴ showed that in peripheral nerves, innervating both skin and muscle, and also in the dorsal roots of spinal nerves, there are large numbers of very small amyelinated fibers which outnumber the larger myelinated fibers. In some cases the ratio is as high as 4:1 or even higher. Small nerve fibers are also found in great numbers within the spinal cord itself.

Ranson showed in cats that these small fibers become segregated from the other fibers entering the cord and form a distinct lateral tract in the dorsal root. The small fibers of this tract of Lissauer enter the substantia gelatinosa of Rolando within a segment or two after they enter the cord. The small fibers, therefore, constitute a separate pathway and

follow a separate course. They cross over to the other side of the cord and ascend in the lateral spinothalamic tract, which we now recognize as the tract primarily responsible for the transmission of pain.

Ranson, in experiments on cats, studied the effects of afferent stimulation upon such autonomic responses as heart rate and blood pressure. He then cut the lateral portion of the dorsal root containing the small nerve fibers and repeated the stimulation. In this instance, the typical autonomic responses did not occur. He thus showed that those responses ordinarily associated with pain, such as struggling, rise in blood pressure and rise in heart rate, are abolished when the small nerve fibers are cut. Although the evaluation of pain in the experimental animal presents obvious difficulties, Ranson's experiments, nevertheless, seem to provide a fairly secure basis for the assumption that the small fibers are the primary means of transmission of painful impulses.

In man, the small fibers do not become segregated in the clear-cut manner they do in cats. In the case of the trigeminal sensory fibers, however, there are several different roots, one of which is the so-called "bulbospinal root" forming the bulbospinal tract that runs to the spinal nucleus of the trigeminal nerve. This particular tract contains practically all the small fibers of the trigeminal nerve. Sectioning of the bulbospinal tract in man rather completely abolishes painful sensations arising from the face. So, in the trigeminal nerve of man, at least, we have an anatomical situation which is analogous to that which exists generally in the spinal nerves of cats.

Small nerve fibers are widely distributed throughout the body. We find them in the periosteum, in fascia, in muscles—nearly everywhere. Although the precise function of these nerves is still a moot question, it seems safe to assume that frequently they are responsible for the transmission of pain impulses. We know that pain of a very severe type may arise from many deep structures and often is of a peculiar and severe nature. For example, pain arising from the periosteum is of a particularly unpleasant character, frequently resulting in nausea and even syncope.

The American physiologists Erlanger and Gasser³ laid the basis for the modern classification of nerve fiber types in their brilliant monograph, *The Electrical Signs of Nervous Activity*. Erlanger and Gasser classified nerve fibers into three main groups, the A, B, and C groups. These were further subdivided, so that the A group contains four subgroups of alpha, beta, gamma, and delta fibers. The C fibers are divided into two groups, the sympathetic or s-group of C fibers, and the dorsal root or dr-group of C fibers. These classifications are based

upon such criteria as the diameter of the fibers and the velocity of the nerve impulse in the fibers. In general, the large fibers conduct impulses most rapidly, and the small fibers least rapidly. Also, myelinated fibers tend to conduct impulses more rapidly than amyelinated fibers. The A fibers range in size from 1 or 2 microns up to 20 or more microns in diameter, and they may conduct impulses as rapidly as 100 meters per second or even faster. The B fibers have a diameter of the order of 3 microns and conduct impulses at about 15 meters per second. The C fibers have diameters of the order of 1 micron and conduct impulses at the rate of 1 to 2 meters per second.

As a result of Ranson's studies in cats, as well as studies by other investigators, it is customary to identify the transmission of pain with small fibers, in particular with the C fibers and the delta division of the A fibers. The C fibers occur in the dorsal roots of spinal nerves and also in visceral nerves. The cranial nerves contain relatively few C fibers. Presumably, pain is predominantly mediated in the cranial nerves via the A-gamma and A-delta fibers.

Amyelinated fibers are relatively resistant to asphyxia or anoxia, as compared with large fibers; small fibers are more sensitive to the action of anesthetic agents and toxins than are large fibers. Pressure applied to a nerve will block larger fibers before it will block smaller fibers. The use of anesthetics in blocking small fibers is a common method used by physicians and dentists for the prevention of pain. Pressure has been used by physiologists to block large fibers in experimental investigations. We know of many instances in which large fibers must be blocked, as in asphyxial or anoxic states, while the smaller fibers are still firing. Such a situation occurs, for example, in an area where ischemia exists. Ischemic pain arising in the myocardium and in skeletal muscle is of particular interest to clinicians.

Care must be used in assuming that the results of animal experimentation apply to humans. Distinct differences exist between the nerve-fiber distribution in animals and in human subjects. Although visceral fibers tend to be of the small type in animals, such as the monkey, recent studies indicate that in man there are many very large visceral fibers. There is also good evidence that cutaneous nerves in man contain a relatively large number of large fibers—fibers which, in fact, may be the largest in the body. The presence of large fibers, both in the visceral area and in the skin, may account in some measure for the rather exquisite types of sensation which occur in man. We must be cautious, therefore,

in applying the results of animal experimentation to man, without being careful to check the anatomical situation in man.

Brookhart and his colleagues in Oregon² have described a preparation for the study of pain in cats which is likely to yield important information. These investigators have chosen the dental pulp as a convenient preparation for study. The dental pulp can be stimulated by suitable electrical means and recordings made from various areas of the brain, particularly the mesencephalon and diencephalon.

There is good evidence that the dental pulp is supplied only by small fibers belonging, not to the C group, but to the A-gamma and A-delta groups. The nerve fibers supplying the human dental pulp correspond in their fundamental physiological characteristics very closely with the A-gamma and A-delta nerve fibers in cats.

The Oregon workers have already shown the presence of at least two new pathways for pain in the brain, which involve the central gray and reticular substance. Considering other recent studies on the reticular formation and the functions ascribed to this structure, it is of particular interest that the Oregon workers have been able to record electrical activity from it in response to stimulation of the dental pulp. We may conclude from such studies that the classical pain pathways worked out by Ranson and other anatomists may not be the only routes for the transmission of pain. This may account for the fact that some operative procedures which, on the basis of classical considerations and classical description, ought to relieve pain, sometimes do not. This apparent discrepancy might be explained if extra pathways, perhaps quite diffuse in nature, are available for the transmission of painful impulses.

It is interesting to consider the possible significance of nerve fibers of differing diameters. What is the physiological significance of different-sized fibers in the same nerve? As Gasser has pointed out, it may be that, with a variety of sizes of nerve fibers conducting at different velocities, the central nervous system is stimulated in a manner which would not occur if all of these fibers conducted at the same rate. If two types of pain fibers, for example, are stimulated simultaneously, central stimulation would occur in a less synchronized manner if the two nerve fibers conducted at different rates than if they conducted at the same rate. It might be, according to Gasser, that the differences in the time of arrival of impulses in the central nervous system are the mechanism by which the brain interprets sensation. This, however, is pure speculation until further evidence is available. Actually, we know very little about what happens within the central nervous system after the various nerve impulses arrive there. It is at this point that our neurophysi-

ological knowledge fails us and that we must depend upon psychological methods of study.

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Neurophysiological Aspects

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IN DISCUSSING the clinical aspects of pain, it should be emphasized that we are less interested in the sharp, pricking type of skin pain, which has been the subject of classical physiological investigations, than in the deeper aching, burning and crushing types of pain which tend to persist, to become chronic, and which frequently produce an exaggerated response on stimulation.

In the preceding paper, Dr. Ralston presented evidence to show that the small-diameter sensory nerve fibers are more concerned with the transmission of pain than are the larger nerve fibers. A different hypothesis has been fostered in recent years by Sinclair¹⁴ and others at Oxford. This theory relates the sensory modalities to certain patterns of nerve impulses that are spatially and temporally dispersed, rather than to fiber size.

In my opinion, a modification of the theory based upon the specificity of fibers is more satisfactory than either the classical fiber-groups theory (see also Gasser⁶ and Bishop³) or a "pure" patterns theory which disregards the significance of fiber-size groupings. The modifications suggested include the following points: (a) That pain, especially the sharp, "fast," epicritic type, is not transmitted exclusively by small fibers and certainly not exclusively by the myelinated C-fiber group (although the deep aching pain may be more closely tied to the latter); (b) that sensory modalities other than pain may not be exclusively transmitted by the larger fibers; and

(c) that sensory impulses arriving in one size-type of nerve fibers may, by interaction in the central nervous system, modify the quality and intensity of another sensory modality mediated simultaneously by another size-type of fibers.

According to still another view of the peripheral mechanisms for transmitting pain, any stimulus, if strong enough, leads to the perception of pain because of the number of nerve fibers activated and the frequency of impulses in each fiber. Pain would thus be a matter of degree, or intensity, of stimulation and not of any specificity of fiber groups (e.g. see Schiller¹³). As a general case, this hypothesis is almost certainly invalid. For example, one can electrically stimulate the ulnar nerve through the skin at a variety of frequencies and with an intensity that is undoubtedly activating most of the larger myelinated fibers, and this results merely in a tingling sensation, referred to the area of representation of the nerve (Thompson, *et al*¹⁶). In this situation the intensity of the nerve impulse barrage from the area of representation is greater than would occur with a small pinprick producing pain. Moreover, clinical pain occurs not infrequently in situations which appear to involve decreased rather than increased sensory input, as with incomplete nerve regeneration or amputation. On the other hand, it is true that many stimuli do become painful when they reach a certain intensity. It would seem more appropriate, however, to explain this common property in terms of local injury, which usually is present when such an intensity of stimulation is reached. Such an "injurious" stimulation, even though common to various modalities of stimulation, might be mediated by relatively specific groups of fibers that give rise to pain perception.

If the small nerve fibers, particularly the myelinated or C fibers, are importantly concerned with the transmission of impulses leading to pain perception, then we need to know a great deal more about the activation and function of these nerve fibers under different environmental conditions. This knowledge would be especially important to our understanding of such abnormalities as neuroma in amputees, and points of pressure or ischemia affecting nerves.

For example, do these small nerve fibers have a low threshold for certain types of chemical stimuli as compared with larger myelinated fibers? Abnormal chemical environments, such as acids, hypertonic solutions and the P-factor,* tend very readily to elicit pain as compared with other sensations. Some preliminary reports show that the myelinated C fibers have little or no power of accommodation as compared with other nerve-fiber groups.⁹ This

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*Pain factor: Some possible specific chemical liberated in the injured tissue which acts as an exciting agent to the painful endings.

means that they would not require sharp changes in the environment in order to be activated, but would respond to slowly changing or even steady stimulation. Their poor accommodation would fit in with the idea of their being sensitive to chemical stimuli and might also help to explain the chronic nature of some pain in terms of sustained repetitive excitation by chemical agents abnormally present in the area. With respect to pressure, there is a suggestion from work by Aird and Pfaffmann² that light pressure on an isolated nerve can produce spontaneous firing of impulses in the smaller nerve fibers more readily than in the larger ones.

Artificial Synapse or Ephapse

It was demonstrated some years ago that a nerve impulse traveling in a given fiber produces fluctuations in the excitability of other nerve fibers alongside it. Under certain abnormal conditions, the adjacent nonconducting fibers may be stimulated to propagate nerve impulses, thus creating a so-called artificial synapse or ephapse (for discussion, see Lloyd¹²). One such abnormal condition, demonstrated by Arvanitaki, involved the removal of calcium ions locally by placing a drop of sodium citrate on an invertebrate nerve. Granit and co-workers⁸ showed that the cut end of a nerve, at least for several minutes after the nerve had been transected, acted as an ephaptic region. Moderate pressure on a nerve trunk—insufficient to block nerve conduction—is capable of producing an ephaptic region. Cross stimulation has been found to occur much more readily from motor nerve fibers to sensory nerve fibers than from sensory to motor.

It is tempting to postulate that certain types of chronic pain may be due to the creation of ephapses. Thus, in neuroma the conditions may be particularly favorable for the ephaptic stimulation of sensory nerve fibers and especially those mediating pain. Although this is yet to be demonstrated experimentally, patients occasionally behave in such a way as to suggest this explanation. Dr. Inman recently brought to the attention of our group a man who had suffered an avulsion of the arm, which left him with considerable paralysis and sensory loss in the hand and forearm. The patient suffered a good deal of aching pain, largely referred to the anesthetized and paralyzed hand. The pain was greatly increased when he tried to move the muscles of his hand, and this in spite of the fact that no visible muscular movements resulted from his effort. This might be explained if we assumed that motor impulses, initiated by the patient's voluntary effort, were able to produce cross excitation in some of the sensory nerve fibers at a point in the same peripheral nerve that was made ephaptic, either directly or indirectly, by the avulsion process.

CENTRAL FACTORS

Aside from psychological factors (discussed by Dr. Albronda in this symposium) physiological processes at various levels of the central nervous system would appear to be important, or even essential in the production of chronic pain. First should be mentioned the well-known referral and radiation of pain in accordance with the segmental patterns of organization within the central nervous system. These phenomena are particularly characteristic of the deep and aching variety of pain. Also, it is a common experience that a counter-irritant applied to the skin may mask the sensory perceptions received from another part, provided both parts are innervated by the same segment of the spinal cord. In this same connection, deep pain may be relieved by rubbing or pounding the affected area. In both instances it would appear that increasing the peripheral sensory input from the affected region results in less pain rather than in more. Thus, all painful states cannot be explained simply in terms of a peripheral focus firing nerve impulses into the central nervous system. Similarly it has been demonstrated by our group that phantom pains in amputees can be dramatically altered by increasing the sensory input into the same spinal cord segments with hypertonic saline injections into the appropriate interspinal tissues.¹⁷

One possible explanation of such phenomena concerns a segmental interaction within the central nervous system so that the perception associated with one type of sensory input is modified when there is another type or source of sensory input arriving at the same time and at the same level of the spinal cord. For example, an increased sensory input from the larger myelinated nerve fibers might conceivably mask sensory impulses arriving in smaller nerve fibers, such as those giving rise to painful perception. Interactions of this type at the level of the spinal cord are at present under investigation in our laboratory.

The effects of chronic rather than acute alterations in the quantity or quality of sensory input may produce similar, or perhaps even more striking, abnormalities in the responsiveness of the central nervous system to normal sensory input. Pain syndromes may be associated with a chronic deficiency in the normal total sensory input from an area, such as, for example, might occur with transected peripheral nerves, with long-lasting functional blocks and in amputations. On the other hand, pain syndromes may be associated with a chronically increased sensory input. This increase might occur with points of hyperactivity at a clearly irritative lesion.

On the deficiency side, one thinks of Cannon's Law of Denervation, illustrated by the fact that both smooth and striated muscle become exquisitely sen-

sitive to normal chemical transmitting agents at the neuromuscular junctions, as well as to a variety of other chemical agents, when the muscles are removed from their nerve supply. This concept has been extended into the central nervous system, particularly by Stavraky and his co-workers,^{4,15} who have shown that when certain tracts are sectioned or lesions made in certain nuclei and areas in the central nervous system, a state of hyperirritability eventually develops in the neuronal center denerated by the lesion. The hypersensitivity extends to certain chemical substances arriving via the blood stream, as well as to the remaining input of nerve impulses still being fed into that center. More recently it has been shown that deafferentation, produced by sectioning the dorsal roots or the nerves peripheral to the spinal ganglia involved, may produce certain changes (which appear to be long-lasting) in the responsiveness of the region of the central nervous system affected (see Eccles and McIntyre⁶ and Teasdale and Stavraky¹⁵). This latter type of experimental situation, of course, closely resembles clinical nerve transections and amputations and, therefore, merits a great deal more study.

Clinical experience suggests that chronically increased sensory input may produce a kind of hyperreactive state in the patient, with unique properties and a persistence of its own. Even a brief period of moderately intense painful stimulation, such as may occur in a badly managed dental procedure, can apparently give rise to a state of persistent pain and hyperreactiveness, which Gerard (1951)⁷ referred to as a kind of "inflammatory process" in the neurons of the spinal cord or brain stem. However, a certain minimum of sensory input is apparently necessary for the maintenance of this abnormal state. It has been observed that a single nerve-blocking injection of procaine at the appropriate nerve or trigger point may abolish this painful state either permanently or for days or weeks, even though the nerve-blocking action of the procaine lasts only for an hour or so. These considerations indicate that states of altered function or excitability, of a type and duration that have not yet been adequately explored by neurophysiologists, exist in central neurons. The existence of memory itself is an obvious example of one such long-lasting neuronal response.

One may add a few additional comments as to places and mechanisms in the central nervous system that may be involved in normal and abnormal pain perception. As suggested in Dr. Ralston's paper, the regions for central relay of sensory impulses arriving along amyelinated and small myelinated nerve fibers, apparently associated with pain, are different from those handling impulses arriving from

the larger myelinated fiber groups. The representation of pain sensation in the forebrain, however, is still not clear. The fact that lesions in certain sites in the thalamus can give rise to the so-called thalamic pain syndrome does not in itself prove that conscious pain is represented in these regions. Indeed, since the lesions involved are usually of a degenerative rather than of an irritative character, it may be argued that pain of this type could also be due to a deficiency of sensory input. Evidence from the laboratories of Magoun, Jasper and others in the last few years strongly suggests that the state of arousal of the cerebral cortex is dependent upon the activity of the reticular formation of the brain stem.¹ Further study of this so-called centrencephalic system may throw light on the sites and mechanisms that are involved in sensory perceptions at the so-called psychological or psychiatric level. It is known, for example, that efferent influences from the brain, acting through the reticular formation, can produce an inhibition of sensory impulses as they arrive at the primary receiving nuclei in the central nervous system.^{10,11} Thus, if a cat, subjected to constant clicking sounds, is suddenly confronted with a mouse, the size of the action potentials produced by the clicks as recorded at the cat's cochlear nucleus in the medulla, suddenly decreases. Such efferent, inhibitory influences on sensory relays could conceivably be an important part of the mechanism suggested earlier that may be concerned with the interaction between the effects of one type of sensory input and another. This same mechanism also may explain observed association of certain psychological and psychiatric states with drastic changes in the conscious sensory responsiveness to various sensory inputs. For example, it is conceivable that when it is suggested to a person under hypnosis that he will not feel pain, a pattern of activity is set into motion in the forebrain which inhibits the relay of sensory impulses elicited by noxious stimuli as they enter the cord from the periphery.

In conclusion, one may say that there is more than one anatomical location and more than one physiological mechanism that could be involved in the production of the persistent, deep and aching type of pain I have been discussing. In fact, it seems likely that even in the same patient more than one such factor is involved. Correspondingly, research must be advanced on a variety of physiological fronts.

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Psychologic Aspects of Pain

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PAIN, a most difficult word to define, ranges in meaning and connotations from penalty or punishment to "distressing uneasiness of mind; mental suffering; grief." Termed a specific modality of sensation, with varying responses, it is more than mere sensation; it is a signal of danger and a warning that something should be done. Perception as a function of sensory receptors varies little from person to person; while the reaction to pain, a function of higher centers, may vary greatly and among many factors, according to the subject's age, sex, tempera-

ment, culture and feeling state. The interplay of some or all these factors determines a person's psychic control of pain and explains in part the range in individual reactions. For example, a martyr entranced with visions of salvation or a soldier wounded in the turmoil of battle may feel little or no sensitivity to pain; whereas others may greatly overreact to rather moderate amounts of pain.²

As a psychiatric problem pain has significance as an emotional experience. For example, Kolb⁷ observed that a patient treated by prefrontal lobotomy for intractable pain no longer complains of pain and yet states, if asked, that he still has the pain; in an examination he reacts to the painful pin prick; or he may complain of pain if a distressing topic is touched on. That is, the lobotomy separates the emotional significance, the anguish or dread of future painful impressions, from the perception of the pain stimulus.

It has long been pointed out that almost all hysterical pains rise in conjunction with an organically determined painful sensation with which the patient associates a painful psychic impression. The complaint of pain becomes a symbol for an associated painful emotional state.

Pain may thus occur as an expression of emotional disturbance or a sign of anxiety. For example, the patient who cannot adequately resolve a conflict between his inner drives and his personal and cultural standards may regress to an earlier form of behavior that once gave satisfaction. The primary symptoms of the neurosis represent these immature behavior patterns. Painful symptoms in any body part may also occur as regressive phenomena.

How pain serves as a source of satisfaction can be seen in children's early experiences. In most families the young child soon learns that his cries of pain bring solicitude, and later he runs to his parents for comfort whenever he is hurt. When the child's slightest complaints are met with undue solace, he becomes conditioned to use complaints of pain to allay his anxiety and gain comfort. Or the child sees his parents' deep solicitude for a seriously ill sibling and tries by fantasied suffering to obtain the same care; as an adult he may still unconsciously seek the envied gratification by overreactions to pain.

Recent studies show another psychogenic basis for complaints of pain. Many civilian amputees who complain of phantom limb pain have had an early, close, continuing association with an amputee. The anxiety produced by fantasies about mutilation is repressed, but may be relighted by plans for surgical operation. Complaints of pain and panic may then appear after the amputation. Persons of hysterical character most often thus identify themselves with

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another and unconsciously use pain to solve a dependent need or to express anxiety about fears of mutilation.

Masochistic self-punishment underlies many chronic painful conditions. It may develop in the child who secretly enjoys seeing the punishment of a sibling and then punishes himself by fantasy for his enjoyment. Or the child brought up to repress feelings of hatred may as an adult use complaints of pain to cover his hostile feelings toward an associate. In a person of rigid, perfectionistic character this guilty response is often associated with other symptoms of an obsessive compulsive neurosis or a depression.

Psycho-genic pain can be complicated by drug dependency or addiction. Development of addiction adds physiologic dependency to the patient's psychologic needs as expressed in his pain symptom. He complains of pain in order to get his gratification with the drug and to prevent the painful symptoms that develop with withdrawal and abstinence.

Szasz^{14,15} thus subdivided the meaning of pain: (1) Pain signals the danger of disrupted continuity of the body and loss of a body part, especially the skin or an appendage—body parts, including functions such as vision or hearing, that are cathected (charged or infused with psychic energy) as objects and can be lost or detached; and (2) pain is a reaction to and a warning against the danger of overstimulation, usually of the inner body parts. Szasz distinguished pain at three levels of symbolization. At the biologic level, pain within a one-body frame of reference signals to the ego some damage or danger to the organism's structure or functional integrity. At the second level pain concerns one or more other persons; the expression of pain, a fundamental way of asking help, needs some validation in the individual's attempt at communication. The third level centers mainly on the communicative nature of pain, which may no longer refer to the body, but may represent a request for help through a complaint about unfair treatment or an attack against a needed but unconsciously hated object.

Cooper and Braceland² grouped persons who complain of pain along a pain spectrum. Along one end fall those with a normal perception of and reaction to pain, a heightened reaction to pain and a psychic perpetuation of organically induced pain; along the other end are those with psychosomatic pain and with psychogenic pain. Midway lies *gestalt* pain, not readily ascribable to either organic or psychic causes; it includes the painful complaint of a phantom limb. Phantom limb pain in selected series occurs in nearly half of the cases of surgical or traumatic amputation of a limb; the persistent

pain is relatively rare but usually continuous, with periodic exacerbation. Various stimuli such as touching the stump, yawning, urinating, becoming fatigued, increase the pain and make the patient apprehensive.

Four major theories are offered to explain the cause of phantom limb pain: (1) The painful peripheral sensations are ascribed to neuromas and other abnormalities in the stump; (2) persistent representation of the painful extremity in the cerebral sensory cortex, according to Pick, or the lack of orientation to the new body image after loss of a limb, according to Schilder, accounts for phantom pain; (3) on a psychogenic basis narcissistic inability to renounce the integrity of the body is described; and (4) psychiatric factors, such as severe psychopathic disturbances, are noted. Riddoch¹⁰ emphasized the organic factors, as did Gallinek,⁴ who admitted, however, the presence of cerebral and emotional mechanisms. Bailey and Moersch¹ minimized the peripheral theory and saw a strong psychogenic component in persistent pain. Ewalt, Randall, and Morris³ found in their study of more than 2,000 army amputees that all patients who complained of phantom limb pain had considerable psychopathic disturbances. Psychiatric factors also had a role in complaints of pain by paraplegics. Men who had dominant psychopathic traits and reacted poorly to their disability tended to be more demanding and complaining than those with sound personality before the injury.

It is likely that complaints of phantom limb pain, in the absence of abnormality of the stump, stem from the patient's poor adaptability and faulty psychophysiologic inhibition of stimuli such as those giving rise to paresthesias, which are often interpreted as pain. A well-integrated, adaptive person can disregard the not overpowering peripheral stimulus.

Migraine headache, cardiospasm, and low back pain are included under psychosomatic conditions with problems of psychogenic pain. Sargent¹² found low-back pain the most common type of functional backache among troops in World War II, and ascribed psychosomatic backache to increased muscular tension arising from anxiety and nervous energy. According to Ruesch's¹¹ formulation of the psychodynamic base in such problems, most of the patients are dependent persons with a low tolerance and stereotyped reactions to frustrations, autonomic manifestations and poor adaptive ability. Because of arrested development at an organ level of expression, they expend energy in muscular, visceral or vascular activity rather than in interpersonal relationships. A prolonged readiness for action, the result of nervous tension, can be satisfied only by somatic discharges, and these physiologic expressions are perpetuated by emotional problems.

Because of their origin in childhood these reactions must be approached by a so-called child psychotherapy with adult patients; and disregard of the emotional component, in Strecker's¹³ opinion, may lead to a persistent organic lesion that finally requires surgical operation. Cooper and Braceland² also emphasized the difficult clinical management of patients with a psychiatrically determined perpetuation of pain that was once organically induced. In these rigid and guilt-ridden patients the terms of pain and penalty are often emotionally linked. Pain inflicted by the superego is used to expiate unconscious guilt, or pain is displaced from the psyche to the peripheral soma—a device more tolerable to the ego.

Hart⁶ noted a rather close parallelism between an ego function, like displacement, and cortical functions. The "reception, interpretation, projection of and response to pain stimuli" are chiefly functions of the cerebral cortex; hence his assumption that the displacement of guilt affect into peripheral somatic pain belongs to the cerebral cortex or the corticothalamic organization. In his observations on the psychiatric aspects of pain, Rangell⁹ also pointed out the strong guilt feeling in patients with conversion hysteria, with pain the price of appeasement to the conscience. Pain in psychosomatic conditions he considers a direct result of the chemical or hormonal changes produced by tension states. Penman,⁸ too, emphasized the important function that pain may serve; it may become the sufferer's chief occupation, an achievement not to be given up lightly. Again it is noted that medical relief of such severe pain, unless accompanied by early diagnosis and careful personality assessment and therapy, will only lead to another pain complex.

These psychiatric investigations underline the need for a complete examination and study, however time-consuming and costly, of a patient with chronic pain and a history of failures in treatment. The psychologic work-up of the case⁵ should include the patient's chief complaint; family history and status; detailed personal history and interpersonal relationships, with their coloring of his problems; his personality make-up; the whole setting of the present illness; and a comprehensive mental examination. The physician's attitude should be one of friendliness and understanding, in his efforts to achieve a true picture of the patient.

If the diagnosis is not clear after thorough medical and psychologic study, a psychiatric consultation may be indicated, and can usually be carried out successfully. At times the psychiatrist may request further information from the referring physician; or an interview with family members; or a psychological test profile, to be made by a well-trained, experienced clinical psychologist.

In summary, clinical pain must be considered a syndrome with both psychic and somatic elements. Cooper and Braceland² outlined the basic considerations to be kept in mind in evaluating the problem of pain:

1. Consider any emotions that may initiate a painful state or exaggerate a patient's reaction to pain.
2. Investigate carefully the patient's milieu—marital status, socioeconomic situation and ways of reacting to stress and illness.
3. Explain adequately to the patient the interaction of psychic and somatic factors.
4. Understand that unwise probing, injecting, massaging or denervating minor defects in trying to relieve pain that is psychically perpetuated serves to fix the neurosis and lessen the chances for cure; the neurotic patient often thrives on such iatrogenic factors.
5. Realize that hostility begets hostility. Listen without anger to the patient's undue complaints and gain his confidence.
6. Perceive that reassurance helps little and at times does harm; whereas careful reeducation of the patient is almost always effective.

With these considerations, psychiatric judgment thus ranks with medical and surgical opinion in the clinical and therapeutic plans for the patient who complains of pain.

END OF PART I

Parts II and III of this symposium will appear in coming issues of CALIFORNIA MEDICINE

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Operations Upon the Aged

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IN A PAPER titled *The Aging Lung*, Richards⁹ recalled the story of one Thomas Parr, a man of England who was said to have lived to the age of 152 years. Old Parr, the story goes, was summoned to the court of Charles I from his home in Shropshire as a curiosity for the king to see. He was appropriately wine and dined, and promptly died. Whereupon the king ordered his personal physician—William Harvey, none other—to perform an autopsy on the body. Dr. Harvey pronounced all the organs of the late Thomas Parr to be normal and sound. No anatomical cause of death was discovered, and old Parr was said at last to have died of "a surfeit," a diagnosis as satisfying to the clinician as many of the diagnoses returned by pathologists even today.

In our time, with the number of aged persons in the population increasing apace, clinicians quite commonly observe normal viscera in the elderly. Groom³ noted that although the increase in population of the United States between 1930 and 1940 was only 11 per cent, the number of people between the ages of 65 and 74 years had increased by 35 per cent. Moreover, United States census data supported a conclusion that if a person reaches the age of 60 years, his life expectancy is 76. Ziffren¹⁰ estimated that in 1953 there were 12,269,537 men and women over the age of 65 years in this country.

The general surgical experience with patients of this older age group is well exemplified by the report of Haug and Dale,⁴ who found that the over-all mortality rate so far as elective procedures was concerned was approximately 5.4 per cent, and for emergency procedures in the same group the mortality rate was 21.9 per cent.

In light of data of this kind, it is somewhat disconcerting for surgeons to have internists advise against surgical therapy for old patients simply because they are old. It is the purpose of this presentation to report surgical mortality experience with the difficult clinical material on the ward service of the San Francisco Hospital quite similar to that reported by Haug and Dale. For the purposes of this report, the record of every patient who entered the male surgical ward on the Stanford University Service from May 1953 to May 1955 was studied.

• From the point of view of the surgeon, as repeatedly emphasized in the surgical literature, the mortality rate for operations upon old persons is only slightly higher for elective surgical operations than for the same operations on younger persons when proper preoperative and postoperative precautions are taken. However, the mortality rate for emergency operations is much higher in old persons than in younger ones. Many surgeons believe, therefore, that disease for which operation is otherwise indicated should be treated surgically irrespective of the age of the patient per se.

The authors' experience with operations upon old persons at the San Francisco Hospital accords with these conclusions.

Neurological, urological, eye and fracture problems were not included. That this unit is representative of the hospital population as a whole is demonstrated by the fact that the ratio of patients over 65 years to the total entries for the fiscal year 1954-1955 was 3,718:19,467, while the ratio for the unit under study for the two-year period was 330:1,974—both roughly 1:6.

In Table 1 the age distribution of the patients by five-year grouping is shown. Table 2 lists the types of operations performed in each group. Table 3 shows sample mortality rates associated with various procedures. Table 4 compares the mortality rate in emergency procedures with that in elective operations.

Preparation of aged patients for operation is most important. Obviously, restoration of fluid balance where loss has been incurred by vomiting or diarrhea is routine. In general, it is preferable to have elderly patients underhydrated rather than overhydrated, since they are prone to pulmonary edema if a cardiac or renal lesion is present. Perhaps the most important of the hidden deficiencies in the aged is an insufficient amount of blood, as has been stressed by Cole,² Beling,¹ and others. Since shortage of blood cannot be reliably diagnosed otherwise, blood volume determinations should be carried out. Adequate transfusion should be an integral part of operative preparation.

Richards⁹ pointed out that the pulmonary reserve as far as the lung itself is concerned is not impaired too seriously unless there is obvious pulmonary disease present. He noted that fixation of bones of the

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TABLE 1.—Distribution of Age Groups Over 70 Years of Age, Male General Surgical Ward, San Francisco Hospital, May 1953-1955

Years	Number of Patients
70 to 75.....	192
75 to 80.....	62
80 to 85.....	50
85 to 90.....	22
90.....	4
Total	330
(Total number of admissions for this period, 1,974)	

chest wall is a much more dangerous factor in preventing adequate ventilation and expectoration than the so-called emphysematous changes in the lungs. Because fixation of the chest wall is so common in the aged, the authors do not hesitate to perform tracheotomy as the last step in the operation in every case in which the lungs are wet, as was recommended by Johnston and co-workers.⁶ This is always valuable in thoracotomy and often in upper abdominal operations.

Oxygen is administered routinely postoperatively until the patient is fully conscious and as long as there is any suggestion of cyanosis.

Pulmonary aspiration of gastric contents is not uncommon in the aged. Therefore gastric aspiration preoperatively and close and constant attention postoperatively until the patient is fully conscious are recommended. Gastrotomy for this purpose will help prevent pulmonary complications.

In the present series, local and epidural anesthesia was used whenever possible.

Cole² said that in some cases corticotropin (ACTH) and cortisone can make an inoperable patient operable by increasing appetite, eliminating fever and bringing about a sense of well-being. Cole gave 100 mg. of corticotropin for five to six days preoperatively. The authors have not had much experience in the use of hormones preoperatively but have been impressed with the effect when used postoperatively in aged patients who appear to react poorly to the operation.

In the belief that in general for aged patients the shortest possible time at surgery is best, the authors use staged procedures for old persons when possible.

DISCUSSION

The experience here reported appears to accord with that reported in the surgical literature: After proper preparation aged patients stand major surgical operation with only a slightly greater risk than younger patients.⁸ It therefore would seem proper to recommend elective surgical treatment of disease within the surgeon's province when the mortality rate is low rather than wait until, say, the

TABLE 2.—Types of Operations on Patients Over 70 Years of Age, Male General Surgical Ward, San Francisco Hospital, May 1953-1955

	Number of Operations
Gastric resection	19
Appendectomy	3
Herniorrhaphy	65
Amputation	22
Hemorrhoidectomy	3
Sympathectomy	7
Relief of bowel obstruction.....	9
Colon resection	7
Repair of perforated viscus.....	9
Cholecystectomy	11
Exploratory laparotomy	6
Thoracotomy	5
Esophagectomy	1
Colostomy	3
Whipple	1
Choledochostomy	1
Cecostomy	3
Neck dissections	6
Miscellaneous	14
Total operations	195

TABLE 3.—Sample Mortality Rates in Relation to Type of Procedure, Male General Surgical Ward, San Francisco Hospital, Patients Over 70 Years of Age, May 1953-1955

Operation	Number	Deaths	Per Cent
Gastric resection	19	2	10
Herniorrhaphy—elective	59	0	—
Herniorrhaphy—emergency	6	1	16
Amputations	22	6	27

TABLE 4.—Comparison Death Rate in Emergency and in Elective Operations, Patients Over 70 Years of Age, in 85 Major Surgical Operations, Male General Surgical Ward, San Francisco Hospital, May 1953-1955

Type of Operation	Number	Deaths	Per Cent
Emergency	22	5	23
Elective	63	2	4

hernia strangulates or the gallbladder disease becomes acute or gallstones pass into the common duct or bowel.

The contraindications to operation upon the aged are the same as those for younger persons, but they are more likely to be present and often are more difficult to relieve. Very frequently an aged patient who, by emergency surgical intervention, has been relieved of an acute condition which has arisen out of a chronic disease, asks, "Why was it not possible to have undertaken this operation years ago?" The authors believe that the operation was possible within an acceptable limit of risk in most such cases and should have been undertaken as an elective procedure, provided definite contraindications other than the age of the patient were not present. The hazards of emergency operation in the aged have to do mainly with coexisting systemic diseases, which might be corrected beforehand under conditions of

elective operation. Those chronic conditions, therefore, that are likely to lead to acute surgical emergencies, should be given even more serious consideration in the aged than in younger persons. Anticipation of the real dangers of an acute exacerbation of a chronic surgical disease in the aged has become an important part of the consideration for elective operation.

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Infantile Diarrhea

Tolerance to Solutions of Electrolytes by Mouth

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OWING TO the classic observations of Darrow¹ who in 1946 demonstrated the importance of potassium replacement in the treatment of diarrhea in infants, the mortality in this condition can now be greatly reduced. Replacement of this ion as well as of sodium,³ chloride and calcium⁵ is necessary in the restoration of the disturbed electrolyte metabolism in diarrheal states.

As so often happens, the administration of potassium salts at first was viewed with some apprehension by many physicians, which was quite understandable in light of the previous widespread teaching concerning the toxic effects of potassium, particularly on the cardiac muscle and especially when given intravenously. Fortunately, however, Darrow and others made carefully controlled studies and outlined a regimen for the safe administration of potassium salts in infants with diarrhea. They recommended that, when tolerated, electrolyte solutions be given orally. A great variety of fluid-and-electrolyte solutions for oral use, made up by pharmacists or mixed at home according to a physician's prescription, has come into use. This is a real advance in therapy since the early use of electrolytes by mouth may obviate the need for intravenous therapy and may considerably lower the hospitalization rate of infants with diarrhea. However, there has been a tendency on the part of physicians to forget that salt solutions can be irritating to the gastrointestinal tract of an infant. Apparently some of the formulas are too concentrated. Hansen and Giffs⁴ said that if they gave Darrow's solution by oral route in a stronger mixture than one part of Darrow's to two parts of 5 per cent glucose, the patients had gastric distress and vomiting. With the recent advent of commercially prepared electrolyte solutions for oral administration, it is timely to evaluate the factor of concentration as it affects tolerance by the infant.

PLAN OF STUDY

The patients observed in this study were infants in Kern County General Hospital who had diarrhea and were moderately to severely dehydrated. At the

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• Since Darrow's recommendation of electrolyte administration by mouth to infants with diarrhea, the constituting of a palatable liquid has been in the minds of all persons concerned with the treatment of diarrhea. Owing to the frequent association of gastric distress with oral administration of electrolyte solution, presumably because of increased osmolality, a study was made at Kern County General Hospital to determine what osmolality of solution was tolerated by most infants. For this purpose a commercially prepared oral electrolyte solution was used. When this new solution was given undiluted—that is, at an osmolality of 20 times that of physiologic solution—only one of 29 patients, who were acutely ill and dehydrated, refused it or vomited it, probably due to irritation of the gastric mucosa. However, at a dilution of 1:3 with 5 per cent glucose and an osmolality of six times physiological, only one of the 29 infants vomited and two others occasionally refused it.

The length of hospital stay was not shortened by the substitution of the commercial preparation in either dilution. However, since the babies readily drank this electrolyte solution, it was possible to stop parenteral administration of electrolytes once fluid replacement had been carried out when the patient was first admitted.

hospital the medical needs of the indigent in a total population of approximately 250,000 are cared for. Kern County, located in the southernmost end of the San Joaquin Valley in central California, has a climate that is semi-arid with daily temperatures commonly over 100°F. throughout the spring, summer and autumn months. It is primarily an agricultural area. Many thousands of migratory farm laborers, traveling with their families, are employed. Their living conditions usually are poor; houses are frequently overcrowded and makeshift dwellings are common. Infantile diarrhea has every opportunity to become a major problem.

Although the Kern County mortality rate for diarrhea has decreased as it has for the nation as a whole, it is still three times greater than the national average. In 1930 the mortality rate (per 100,000 people) was 51.3 for the county compared with the national rate of 19.4; in 1948, 19.0 compared to 4.7. The total yearly admissions for infantile diarrhea to Kern County General Hospital have

TABLE 1.—Tolerance for Oral Electrolyte Preparation* in Infantile Diarrhea

Patient	Age (Months)	Sex	Polysal Full Strength	Polysal Diluted	Reaction
1	4	F	X	X	Took well and no vomiting
2	3	F	X	....	Vomited
3	6	F	....	X	Took moderately well and no vomiting
4	2	M	X	....	Vomited
5	5	F	....	X	Took well and no vomiting
6	12	F	X	X	Vomited every other time
7	4	M	X	....	Fairly well taken and no vomiting
8	4	M	X	X	Refused or vomited when taken
9	7	M	X	....	Refused at first; took well after being hydrated
10	11	F	X	X	Vomited
11	7	M	....	X	Took well; no vomiting
12	18	M	....	X	Vomited
13	4	F	....	X	Took well and no vomiting
14	5	M	....	X	Refused or vomited
15	2	M	....	X	Took well and no vomiting
16	3	F	....	X	Took well and no vomiting
17	5	F	....	X	Took well and no vomiting
18	9	M	....	X	Refused most of time; no vomiting
19	8	F	....	X	Took well and no vomiting
20	7	M	....	X	Took well but vomited part of time
21	3	M	....	X	Took well and no vomiting
22	12	F	....	X	Took fairly well and no vomiting
23	5	F	....	X	Took well and no vomiting
24	6	F	....	X	Refused or vomited
25	6	M	....	X	Took well and no vomiting
26	9	F	....	X	Took well and no vomiting
27	8	M	....	X	Took well and no vomiting
28	4	M	....	X	Took well and slight spitting up
29	7	M	....	X	Took well and no vomiting

* Polysal.

Note: Polysal dilution 1:3 with 5 per cent glucose and water.

not decreased correspondingly. Since 1948 the number of infants admitted annually for severe diarrhea has been between 275 and 400. They were ill and severely dehydrated.

THERAPEUTIC REGIMEN

The stools of all patients admitted because of diarrhea were cultured on three consecutive days.

A plan of treatment similar to the recommendations of Darrow² was adopted. In outline form this treatment was as follows:

A. Fluid Administration

1. *Shock.* If the patient is in shock or a shock-like state (cyanosis, poor skin turgor, weak cry, responds poorly to painful stimulation), whole blood or plasma is immediately given intravenously (20 to 30 cc. per kilogram of body weight) along with an equal volume of physiological saline solution. In severe cases this is given rapidly. In mild cases in which blood or plasma is not indicated, intravenous

therapy is begun with physiological saline solution.

2. *Subsequent fluid and electrolyte administration.* Following the initial intravenous therapy, a solution of potassium chloride-sodium chloride-sodium lactate (Darrow's) is given intravenously or subcutaneously, 80 to 100 cc. per kilogram of body weight. It is given slowly by drip over four to eight hours.

As a precautionary measure, before the administration of potassium-containing fluid it was definitely established that there had been urine formation, especially in the case of patients in shock.

The total daily fluid requirement was calculated to be 150 to 250 cc., or even more per kilogram of body weight. After the initial administration of fluid, additional salt-containing solutions were given. For severely dehydrated infants this was made to total approximately 100 cc. per kilogram of body weight. The balance of the day's fluid requirements was made up of 5 per cent glucose in water.

3. *Oral administration of fluids and electrolytes.*

As soon as fluids could be tolerated orally, the following solution (Polysal Elixir*) was used:

	Gm. per 100 cc.
Sodium chloride U.S.P.....	3.33
Potassium chloride U.S.P.....	2.22
Calcium lactate NF.....	0.553
Magnesium gluconate 2H ₂ O.....	0.50
Sodium lactate, anhydrous.....	5.0

4. *Serum electrolyte studies.* Usually on the second day, especially if the infant did not seem to be responding well, determinations of the bicarbonate, chloride, sodium and potassium content of the serum were made in order to guide subsequent therapy.

B. Meeting Food Requirements

First, all food by mouth was omitted until vomiting had ceased and dehydration corrected, which usually occurred within 24 hours. Then at first 5 per cent glucose solution was given, followed by the previously described oral electrolyte formula. With retention of glucose solution a powdered milk formula composed of fat 1.5 per cent, protein 4.6 per cent and carbohydrates 3.8 per cent was given by diluting one tablespoonful of dried powdered milk to three ounces of water.

At eight-hour intervals the patient's status regarding intake of fluid and electrolytes was reviewed. If necessary, fluids or electrolytes were given parenterally if they had not been taken orally.

TEST GROUP

In the group of 29 patients selected for the study of tolerance for concentrations of electrolytes, 17 (58 per cent) were six months of age or younger. All the patients were under one year of age except for one 18-month old infant. All were treated according to the treatment schedule previously outlined.

Tonicity of Administered Solution

The manufacturer of the oral electrolyte solution which was used in this study recommends a dilution of 0.5 cc. to 1 ounce of water or other nonelectrolyte fluid for each 10 pounds (4.5 kg.) of body weight every 2 to 3 hours. According to Beniams† the above dilution causes a depression of freezing point to -0.83°C . Physiological saline solution (Cutter) has a freezing point of -0.56°C . Therefore, the tonicity of the recommended dilution is 1.4 times physiological (0.83:0.56).

However, the study was not concerned with the ability of infants to tolerate a solution orally which

was, for practical purposes, isotonic. Instead, two stronger solutions were tested, one undiluted and the other diluted 1:3 with 5 per cent glucose and water. Undiluted, this solution freezes at -11.3°C . So the undiluted solution is about twenty times as osmotically active as normal saline (11.3:0.56). At a dilution of 1:3 with 5 per cent glucose in water, the freezing point is -3.4°C ., and the tonicity is 6 times physiological (3.4:0.56). Thus the solutions tested were, respectively, 20 times and 6 times as osmotically active as plasma.

The first ten patients were given 6 teaspoonfuls of the concentrated oral electrolyte three times daily. The other patients were given the same solution diluted 1:3 with the glucose solution.

RESULTS

Tolerance of electrolyte solution. Data concerning acceptance and tolerance of the preparation are summarized in Table 1. Only two of the ten patients were able to retain the concentrated (*i.e.*, times 20 isotonic). The remaining eight refused it or vomited it. Presumably the hyperosmolarity of the undiluted solution was irritating to the gastric mucosa. The solution was thereafter diluted one part of Polysal to three parts of 5 per cent glucose in water (*i.e.*, 6 times physiological). When this diluted solution was given to the original ten patients who had previously received the concentrated solution, only one vomited. Of the subsequent 19 patients who received diluted Polysal, only one refused it. Two other patients in this group refused the preparation occasionally, but no vomiting occurred once it had been ingested (See Table 1).

The nurses caring for these patients were pleased by the eager manner in which the patients took this liquid.

Effect on hospital stay. The duration of hospitalization of these subjects was comparable with that of the usual regimen for such patients in this hospital, the average being 21 days.

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† Personal communication. Herman N. Beniams, Ph.D., Director, Department of Biophysical Research, Cutter Laboratories, Berkeley, California.

The Carcinolytic Effect of Actinomycin C

A Report of Clinical Studies

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IN 1941, Waksman isolated an antibiotic from actinomycetes which appeared to have a selective cytotoxic effect upon the spleen and lymphatic system. The actinomycin was extremely toxic to animal hosts and further studies were halted. Subsequently the anticarcinogenic activity of the actinomycetes was reevaluated by a group of German investigators who isolated a crystalline antibiotic termed actinomycin C from a filtrate of *Streptomyces chrysomallus* cultures.⁵⁻⁷ This material had pronounced inhibitory effect on tumors in experimental animals and was reported to have beneficial effect in a series of patients with neoplastic states of the lymphatic system, notably Hodgkin's disease.^{7,8}

The author and co-workers had previously reported that actinomycin C induced a significant and reproducible inhibition of several kinds of mouse tumors, sarcoma 180 and the RC carcinoma, as well as prolonging the life of mice with leukemia L 4946.* In a preliminary manner, a limited report of clinical experiences also was given previously. In the absence of other objective evaluation from American sources, it is the purpose of this report to give a summary of the clinical trials of actinomycin C.*

METHOD OF ADMINISTRATION

The regimen designed by Schulte,^{7,8} was followed in these trials. Daily injections of 200 gamma of antibiotic (provided as 100 mg. of dry material) were given intravenously for 25 days. However, several variations of this routine were also used without noticeable difference in the results. Some patients received the drug daily or five times a week for as many as 60 injections, others received 400 gamma daily for about 25 injections; finally eight-hour drip infusions of 200 to 600 gamma of the antibiotic in light-protected saline solutions were also given. In several instances mild nausea, and

• Actinomycin C was administered to 35 patients with a variety of malignant states. There was no evidence of any toxic reaction.

Of 11 patients with Hodgkins disease, four had brief objective remission ranging from two to four months. Individual patients with chronic myelogenous leukemia, multiple myeloma and neuroblastoma had short periods of clinical improvement.

The usefulness of actinomycin C appears to be limited. It may best be used in instances of Hodgkin's disease where pancytopenia prevents the use of other agents.

rarely some emesis, occurred soon after administration of the drug. Usually this reaction subsided after the first week of therapy. Dosage was approximately as stated despite a wide range of age and weight in patients selected.

Evidence of extensive hepatic disturbance and necrosis was elicited in the animal studies⁴ but none was apparent in the clinical trials in the doses used. It should be noted that the equivalent of the average of antibiotic dose daily (100 gamma per kilogram of body weight) that induced both a significant inhibition of sarcoma 180 and some hepatic disorganization in mice, would be 7,000 gamma for a human weighing 70 kilograms (or approximately 35 times the average human dose used in these trials). Many patients with advanced disease had hepatomegaly from apparent or proved tumor involvement. Careful liver function studies done during the course of actinomycin C therapy showed no deterioration beyond that predictable from tumor progression.

Examination of peripheral blood was done at least once weekly, frequently two and three times weekly. Bone marrow aspiration was done in many instances. In no case did therapy with actinomycin C induce leukopenia, anemia or thrombocytopenia; in fact, therapy was initiated in many instances of hypoplastic and hypofunctioning bone marrow without causing further deterioration.

PATIENTS TREATED

Because the effects of therapy could not be evaluated unless a substantial amount of drug had been administered, it appeared that a minimum period of observation of ten days from the beginning of ther-

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*In supplementary tests it was found that at a level of 150 gamma per kilogram of body weight per day, actinomycin C produced an approximate 25 per cent reduction of growth of the Harding-Passey Melanoma (Field, J. B., Costa, F., and Boryczka, A.—Unpublished data).

TABLE 1.—Summary of Clinical Studies of Treatment with Actinomycin C

Disease	No. Patients	Results of Therapy		
		Observation Less than 10 Days	Objective Improvement*	No Improvement
Hodgkin's disease....	14	3	4	7
Lymphosarcoma	3	0	0	3
Acute leukemia	2	0	1†	1
Chronic lymphatic leukemia	3	0	0	3
Chronic myelogenous leukemia	1	0	1	0
Lympholeukosarcoma ..	1	1	0	0
Chronic reticuloendothelial leukemia ..	1	0	0	1
Multiple myeloma ..	1	0	1	0
Carcinoma, ovary ..	2	0	0	2
Adenocarcinoma, stomach	1	0	0	1
Adenocarcinoma, colon	1	0	0	1
Malignant melanoma	4	0	0	4
Neuroblastoma	1	0	1	0

*Longer than six weeks.

†Therapy for only 12 days. Transferred to another institution; bone marrow aspiration consistent with altered state of disease; however, follow-up not adequate.

apy would be necessary to make an objective recording of results. Patients with a variety of neoplasms were given actinomycin C either when the drug appeared indicated or when no further specific therapy could be offered. Most patients had advanced disease, and some of them were in the terminal stage and did not live for ten days of therapy. A summary of the objective observations is given in Table 1.

Objective changes such as alterations in size of palpable nodes, hepatosplenomegaly, or hilar adenopathy or pulmonary infiltrations as seen on x-ray films of the chest, and on the disappearance of fever, of pruritus and of night sweats, and changes in peripheral blood elements were the basis for evaluating effects in patients with malignant lymphomas. In patients with other tumors, the criteria were changes of visible or palpable tumor masses, abnormalities in x-ray films, the presence of ascites and other such objective evidence. In all cases the diagnosis was founded on an operative or biopsy specimen, and in a number of instances biopsy specimens were examined during or at the conclusion of therapy. The studies of cases of Hodgkin's disease were the only ones considered of sufficient interest to report in detail.

Of 14 patients with Hodgkin's disease, three who were in a far advanced stage died in less than ten days, leaving 11 for evaluation. They were of both sexes and the age range was from 9 to 56 years. Five patients received a course of actinomycin C as the initial and only therapy; only two of them obtained significant improvement. Of the nine other



Figure 1 (Case 1).—Left: Untreated Hodgkin's disease. Right: After treatment with actinomycin C—45 daily injections of 200 gamma each.

patients, who had advanced disease and who had been previously treated, only two could be considered as obtaining a remission from actinomycin C. Only one of each category, previously untreated and previously treated, had a remission that persisted for more than two months. A summary of four "improved" selected cases follows:

CASE 1. A 28-year-old man had progressive swelling of the left side of the neck over a period of five weeks, with pruritus and occasional low-grade fever. Biopsy of a cervical node showed Hodgkin's disease. Some hilar adenopathy was observed in an x-ray film. At the beginning of therapy the circumference of the neck was 38.75 cm. (Figure 1) and the structure of a biopsy specimen was typical of Hodgkin's disease (Figure 2). After five weeks of therapy (25 doses of 200 gamma antibiotic per day) there was considerable reduction in the size of the palpable nodes and the circumference of the neck was 37.7 cm. Actinomycin C was continued as before for a total of 45 injections. When therapy was discontinued, there were very small discrete residual nodes in the neck and the circumference of the neck was 36.8 cm. (Figure 1). Considerable necrosis and fibrosis was observed in an excised node (Figure 2). Within three weeks of discontinuance of therapy generalized explosive exacerbation of the disease occurred. The body temperature was 105°F. Hepatomegaly, adenopathy, jaundice and anemia were noted. Marrow aspiration showed diffuse and focal granulomatous lesions. A course of nitrogen mustards given intravenously brought about rapid and nearly complete remission.

CASE 2. The patient, a woman 33 years of age, had had biopsy of cervical nodes in September, 1953, showing Hodgkin's disease. Near-radical neck dissection was carried out and 28 involved nodes were removed. In May, 1954, enlargement of additional nodes was noted. Fever also began at that time and it continued despite therapy with a variety of antibiotics. In August, 1954, the patient received (elsewhere) 25 daily injections of actinomycin C, whereupon fever immediately abated and symptomatic improvement was noted. The enlargement of nodes regressed but did not disappear. A node biopsy done shortly after the beginning of therapy was said to

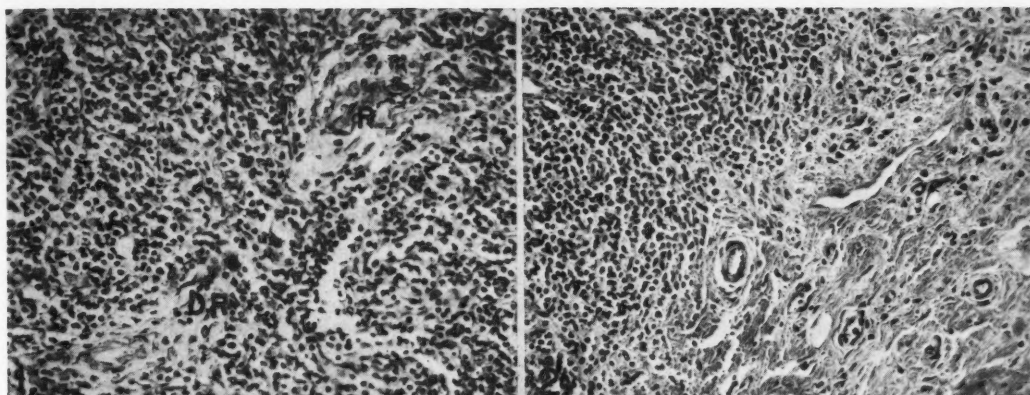


Figure 2 (Case 1).—*Left*: Lymph node biopsy before treatment. Note the proliferation of the reticular cells. Many of their nuclei are indented or polymorphic in appearance. Two Dorothy Reed cells are observed in the field. *Right*: Lymph node biopsy after actinomycin C therapy. Note disappearance of reticular cells and fibrosis of the node.

have shown changes suggestive of "improvement." The patient remained afebrile and otherwise well until about January, 1955, when she had recurrence of intermittent fever to 103°F., night sweats, anorexia, malaise, arthralgia and slight enlargement of additional nodes in the neck besides the persisting enlargement of those previously affected. The hemoglobin value was 80 per cent. Leukocytes numbered 5,000 per cu. mm. (The count had ranged from 3,000 to 5,000 in the previous four months.) A second course of actinomycin C was given and almost immediately there was reduction of fever, disappearance of the subjective complaints, weight gain of 6 pounds in two months and abatement of swelling of several of the more recently affected smaller nodes. Actinomycin was given less continuously, being reduced from once daily to twice weekly over a period of several months. During this time the leukocyte content fluctuated from 3,200 to 7,600 per cu. mm. of blood and the hemoglobin value increased to 100 per cent. Actinomycin was discontinued in early May, 1955, when it was felt a complete remission had occurred. The patient had received 57 injections in 14 weeks. However, within three weeks fever and the previous complaints recurred and the spleen was palpable for the first time. Leukocytes numbered 2,200 per cu. mm.

Daily administration of actinomycin was started again. Although splenomegaly disappeared within a week, fever continued, the hemoglobin value decreased and x-ray films showed some hilar swelling. After 2 weeks actinomycin was discontinued, treatment with triethylene melamine and prednisone was begun and improvement was noted. However, despite x-irradiation and massive doses of corticosteroids, fever continued, the temperature rising eventually to 106°F. and the patient died in October, 1955. Autopsy confirmed the diagnosis of Hodgkin's disease.

CASE 3. A 42-year-old man with a history of three years of progressive biopsy-proved Hodgkin's dis-

ease. He had become less responsive to multiple transfusions and combination therapy with triethylene melamine and x-irradiation. Although receiving cortisone, 100 mg. daily, he complained increasingly of abdominal cramping pains, had diarrheal bowel movements three times daily and fever to 102°F. Para-aortic nodes on both sides were readily felt on abdominal examination and nodes were also felt on rectal examination. An x-ray film of the chest showed a widened mediastinum and a nodular infiltration in both the left upper and lower lobes. A course of 25 injections of actinomycin C was given to supplement the cortisone. In about ten days the patient became afebrile, subjective complaints stopped, the abdominal nodes were no longer palpable and an x-ray film of the chest two weeks after the conclusion of therapy showed clearing of the infiltration and reduction of the mediastinal swelling. With cortisone therapy continued, the patient was well for two months. The previous complaints then recurred.

CASE 4. The patient was a man 31 years of age who had biopsy-proved Hodgkin's disease of nine years' duration. He had been treated repeatedly with x-irradiation and nitrogen mustards. The last treatment had been irradiation to the spleen and inguinal nodes two months before. Since then the patient had had severe night sweats, easy fatigue, nausea, coughing and a 13 pounds decrease in weight. Upon examination, nodes about 1 cm. in diameter were felt in the right cervical chain and the spleen was palpated five inches below the costal margin. Hilar prominences were observed in an x-ray film of the chest. The patient requested actinomycin C therapy. He received 200 gamma daily and relief of cough and night sweats occurred almost immediately. The nausea cleared after about two weeks and the cervical nodes and the spleen were not palpable. After 25 injections of the antibiotic, therapy was stopped and the patient was well for three weeks. Body weight increased 5 pounds. A reduction of hilar swelling was noted in x-ray films. Symptoms then recurred

and increased in severity. Cervical nodes again were palpable. Actinomycin C, 400 gamma one day and 200 gamma the next, was given for six of every seven days; and after two weeks the patient again had mild subjective improvement. However, despite continued therapy the body weight decreased again (9 pounds in two weeks); and with progression of signs of an active disease state, actinomycin was discontinued after 40 injections.

DISCUSSION

In the present limited investigation, the therapeutic regimen of Schulte^{7,8} was followed in general but the results observed did not seem to support a conclusion that actinomycin C might be considered at the level of effectiveness of other chemotherapeutic agents of the nitrogen mustard category in the control of Hodgkin's disease.

Of 11 patients with Hodgkin's disease, only four had objective improvement with actinomycin C, and usually this was of fairly brief duration. Of nine other patients with lymphosarcoma or chronic leukemia, only one had a remission—brief and partial.

That an objective improvement was obtained in one patient with multiple myeloma suggests that further trials with actinomycin C in this disease state are indicated. The temporary remission in one case of metastatic neuroblastoma resembled but was less impressive than remissions obtained with aminofol and triethylene melamine for more than 18 months in the same patient. That no objective improvement was observed in patients with carcinoma of the stomach, colon or ovary, or with malignant melanoma, of course, does not imply that actinomycin C may not be of benefit in other types of malignant growth. However, there does not appear to be sufficient evidence at present to merit an expanded investigation.

Since the administration of actinomycin C was relatively innocuous—it could be given even to patients with pronounced leukopenia and anemia—it would appear that actinomycin C might deserve consideration as a chemotherapeutic aid primarily in instances of Hodgkin's disease where hypoplastic

marrow function and leukopenia bar the use of other agents which would further impair the bone marrow. In addition the clinical results should encourage the development of new actinomycins which conceivably may have greater antineoplastic effect. Already, studies with actinomycin D^{1,2} have advanced to the clinical stages and it is reported that the drug has produced temporary changes in children with Hodgkin's disease, rhabdomyosarcoma and Wilms' tumor but not with acute leukemia. Actinomycin D is an effective antineoplastic agent in mice bearing transplantable tumors¹ and it appears to be about as qualitatively effective as actinomycin C when tested against sarcoma 180 and the RC carcinoma.³

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Mental Health

A Discussion of Various Program Approaches Used in California and the Basic Assumptions Involved

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• The nation's Number One health problem, mental illness, compels careful reevaluation of past and current methods of attack. It also invites consideration of the ways and means of integrating preventive measures that emphasize the conservation of mental health with prophylactic efforts that stress the avoidance of mental illnesses.

A review of the development of both local and statewide mental health programs in California reveals that three fundamentally different approaches have been used: (1) The traditional approach which confines itself to the protection of society from the "insane" by the state, and to the treatment of those who are not legally insane through "private enterprise"; (2) the public health approach which seeks to minimize the causes and/or spread of selected types of psychiatric disorder regarded as mass phenomena; and (3) the sociological approach which stresses the importance of social factors both in the

causation and in the rehabilitation of those mental conditions that are considered to be symptomatic of a "sick" society.

An approach that combines the theoretical and practical implications of all three viewpoints offers some new solutions to the problems of (1) fitting mental health programs to populations; (2) financing; and (3) balancing preventive and clinical services.

Mental illness is not a single disease-entity but a long list of distinctly different conditions. The causes and manifestations are multiple. Biological, psychological and social components in either mental health or mental illness cannot be dissociated in any attempt to understand and deal with so wide a range of illnesses and states of comparative health. Therefore, many professions and multiple public and private agencies are involved in planning, developing and administering a mental health program.

IN CALIFORNIA as in other parts of the United States, mental illness in all its manifestations constitutes the most serious public health problem. The discussion to follow is based upon experiences in this state, and is prompted by the urgent and unmet needs for preventive, therapeutic and rehabilitative services. For example, during the first quarter of last year, 44 different communities appealed to the Department of Mental Hygiene for help in establishing local mental health services. There were 30 applications for federal grant-in-aid funds totaling \$322,887 needed to supplement local public or private funds for such mental health services as outpatient psychiatric departments attached to hospitals, child guidance clinics, psychiatric consultation for schools, mental health institutes, family casework services, mental health programs in health departments, day care programs for mentally retarded, brain-damaged or emotionally disturbed children and a mental health survey of a metropolitan area with a population of five and a half million. Of the 44 communities that sought help to set up local services, 30 had never before requested help or made known their

local needs for services. The sizes of these communities ranged from a city of five thousand to a county or area with a population of over five hundred thousand.

One out of 200 of the population of California was in a hospital last year for mental illness or mental retardation, and it is estimated that every fifth family was affected. The state is now spending \$5.60 per capita of the population to operate its mental hospitals. Only 1 per cent of the state budget however, is allocated to mental hygiene clinics and other preventive services. Growing public demands, the size and costliness of the problem of mental illness, and increasing knowledge of methods of attack all compel a reevaluation of mental health programs and the basic assumptions involved.

DIFFERENT APPROACHES USED IN CALIFORNIA

The traditional approach in California has meant a public, institutional type of custodial care for patients so greatly retarded or so severely mentally ill they could no longer stay in the community. General hospitals refused to take these patients at any stage of illness, partly because of the high costs of treatment. In northern California, 14 years ago, only one general hospital, a university teaching

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hospital, accepted psychiatric patients for treatment. Cost of psychiatric treatment, unlike that for other therapies, is not covered, or is barely covered in a few instances, by prepaid hospital and medical care insurance plans. A survey in 1952 showed that a fourth of Blue Cross and fewer of Blue Shield plans allowed a few days' psychiatric care "in the life of the patient." County hospitals have for the most part served as detention quarters for psychiatric patients until they could be committed; often jails had to perform the service. Even now, only two county hospitals offer psychiatric treatment.

As a result, patients in the acute or earlier stages had no chance for active treatment, and the more hopeless cases jammed the state mental hospitals. Twelve years ago, California's seven mental hospitals had 25,000 resident patients, and the number discharged as recovered or improved was far less than the number of total new admissions. Only 2 per cent of the newly admitted patients were self-committed. The state had no more than six privately supported psychiatric outpatient clinics and only four child guidance centers. There was only one state hospital for the mentally retarded, and it was used for severe cases; patients on the outside had no special training or supervision.

The traditional approach now provides for public mental hospital care of 91 per cent of the mentally ill and retarded in severe or advanced cases, often when improvement is unlikely; but private hospitalization is available for only 9 per cent of such patients, due to the high costs involved, the general unavailability of sickness insurance for psychiatric disorders and the prejudice against psychiatric facilities in general hospitals. There is still consequent widespread neglect of mental illnesses in the earlier, more treatable stages. This approach essentially provides methods of dealing with large aggregations of advanced cases, and it is based on the following assumptions: (1) The state is responsible principally for the care of the "insane" and for the protection of society; (2) there is federal responsibility for the care of service-connected psychiatric disorders in war veterans; and (3) it is the responsibility of "private enterprise" to supply all other mental health services to individual patients.

State and local public health programs have largely focused on preventing certain psychiatric disorders for which definite causes could be found and which lent themselves to mass handling. Inoculation against diseases with brain-damaging sequelae, maternal and child care programs, health education and many other public health measures have reduced the incidence and spread of both congenital and acquired mental illnesses and defi-

ciencies. For the most part, these efforts have not been adopted with the conscious purpose of preventing psychiatric disorders, by either public health officials or the medical profession. The consequent lengthening of life has in fact resulted in an increased incidence of the senile psychoses.

The public health approach comprises prevention of mental illnesses and deficiencies through reduction or elimination of the causes, through intervention in the spread of psychiatric disorders and through measures aimed at increasing the resistance of subjects to mental and emotional hazards. This approach essentially provides methods and techniques applicable to mass phenomena, and it makes the following assumptions: (1) Equality of opportunity for all citizens to enjoy the benefits of preventive services that include the protection of mental health; and (2) the ancient principle of *mens sana in corpore sano*.

In the sociological approach to mental health programs, the individual is emphasized as a member of the family and of larger social groups. Social work, stemming largely from the child guidance movement, first developed casework with children and families. Behavior disorders in children were linked with parental care and with other social situations, including poor economic situations. Social service spread to work with adults whose maladjustments could be ascribed to social and cultural factors. Various kinds of public assistance, job placement and occupational and recreational therapy were among the social means of attack. As a broad result of this experience, many social scientists now advocate a nationwide program of preparation for marriage and family living as the royal road to mental health.

Other sociologists have made ecologic and epidemiologic studies of mental illness and have noted that mental disorders are so distributed within a city that high rates are highly concentrated around the central business district. For example, schizophrenia follows this pattern, whereas manic-depressive rates show much wider scatter. Persons of ethnic or racial minority groups living outside their group have had much higher rates of mental illness than those of the numerically dominant group. Other investigators have found that the lowest socio-economic classes contained a disproportionately large number of serious psychiatric cases, as compared with higher classes; that schizophrenia especially was linked with the lowest class structure; and that the type of psychiatric treatment received is associated with the patient's class position. In the lowest socio-economic groups, physical treatment is sought and obtained for personal malfunctions; in

the higher classes, patients tend to seek and get psychological therapies. These studies, supplementing those of public health workers, point up the distribution and degree of mental illness in a population, along with the social factors in causation and correction.

In California the sociological approach has been valuable. For example, since 1938 the Department of Mental Hygiene's bureaus of social work have increasingly worked with patients on convalescent leave from state hospitals. All types of former state hospital patients may now be placed in licensed private homes for rehabilitation. Since 1945, the family care program has been extended to the mentally retarded. Two information centers, staffed by psychiatric social workers, devote full time to parents' groups and social agencies with special programs for the mentally retarded outside of hospitals. A law passed in 1945 enables mentally retarded children to be trained in public schools, thereby helping to keep these children in the community.

The sociological approach places emphasis upon the individual as a member of society or of the family, and upon the social and cultural determinants of mental illness and health. This approach stresses the importance of social factors both in the causation and in the rehabilitation of psychiatric disorders, which are here regarded as essentially symptomatic of a "sick" society. The sociological approach assumes that: (1) Social and family conditions are not merely the results of individual psychobiological adaptive mechanisms but are, more importantly, prominent as etiologic factors in psychiatric disorders; (2) criteria for healthy and pathological patterns of social organization, and for social action with respect to individual and communal mental health are applicable to the problem of mental illness; and (3) correctional measures, applied to both social conditions and (through education) to individuals, promote mental health.

A combined approach to mental health programming that includes the traditional, public health and sociological viewpoints and principles, has been applied in California and has achieved modest results. By early 1956, the state population had risen to more than 13 million, with the population in some cities and counties having doubled or trebled since World War II. The Department of Mental Hygiene, with its caseload of 56,500 patients under treatment, had 36,500 resident patients in the ten mental hospitals, 8,700 in hospitals for the mentally retarded and 8,300 on convalescent leave, under the supervision of the bureaus of social work. Each of the state's 58 counties had at least one psychiatric social worker assigned to it, with field offices in 18 of the larger cities. The state mental hygiene clinics had over 2,200 patients in treatment at any given

time and were seeing over 6,000 patients per year for an annual total of 38,000 treatment hours. By June 30 of 1955, the seven state mental hygiene clinics, of varying ages, had admitted in less than a decade a grand total of 18,400 different patients. These were patients who could not afford psychiatric care on a private basis; indeed, 85 to 90 per cent were financially dependent or in marginal economic circumstances, and most of them were referred by the medical profession. The outpatient departments of the Langley Porter Clinic and other state hospitals bring the total number of outpatients to about 50,000 treated since 1943. The staffs of these state-operated clinics have been steadily increasing the amount of time devoted to work with children and youth. During the past five years, furthermore, about 17 per cent of staff time has been spent in community mental health services, such as consultation to schools and other social agencies, mental health education and community organization.

Despite the shortages of psychiatric personnel in most states, California has managed to recruit a steady increase. The Department of Mental Hygiene now has about 300 psychiatrists and physicians, 100 clinical psychologists, more than 300 psychiatric social workers, over 700 graduate nurses and 6,700 psychiatric technicians.

It is noteworthy that the state has 11 per cent of the membership of the American Psychiatric Association. Most of these psychiatrists, however, serve the metropolitan areas, and most of them confine themselves to private practice and volunteered services.

The 267 privately operated hospitals and sanatoria that are under licensure and minimal supervision by the Department of Mental Hygiene, in 1955 had over 6,000 inpatients. A small but growing number of nonprofit, private, general hospitals treat short-term, acutely ill mental patients in psychiatric units; again, these are mostly located in the larger urban areas.

Several indices point to increased efficiency in the over-all picture. The state mental hospitals now admit 20,000 patients per year, but they discharge patients as recovered or improved so fast that the past fiscal year's increase was only 750 patients. The index of release rate shows that mental patients now have a 25 per cent better chance to leave the hospital than did patients in 1947. Improvement or recovery rates run as high as 85 per cent of discharged patients. All clinic patients are voluntary admissions, and, with the modernization of the state's commitment laws, an increasing number of state hospital patients now enter voluntarily, at a stage of their illness when optimal results can be

expected. However, the main factors accounting for the striking improvement in the release rate are the steadily increasing medical, nursing, rehabilitative, and social services during the past decade. Although the protection of society from the insane remains an important legal responsibility of the State Department of Mental Hygiene, the combined approach shifts the emphasis from custodial care to active, up-to-date treatment and from exclusively intramural services to extramural programs of both a preventive and rehabilitative nature.

The Department of Mental Hygiene has also helped to organize and finance many of the privately supported and administered community clinics. For example, it helped to create the California Association of Community Psychiatric Clinics, whose chief purpose is the reporting of uniform statistics.

There are now 57 community psychiatric clinics in California. Twenty-five are privately supported, sometimes with the aid of Community Chest funds and national mental health funds. Nineteen are operated by state agencies, such as the four maintained by the University of California, four operated jointly by the State Department of Mental Hygiene with local health departments, one established exclusively for parolees of the California Adult Authority, and ten administered by the Department of Mental Hygiene. Nine clinics are operated by counties and four by the Veterans Administration. Of the 57 psychiatric clinics or outpatient departments in California, 26 are attached to hospitals and 19 have received federal grants-in-aid.

In 1951 the State Mental Health Coordinating Committee, advisory to seven state departments (Corrections, Education, Mental Hygiene, Public Health, Recreation, Social Welfare, and Youth Authority), was created for the purpose of integrating and coordinating their mental health programs. The Department of Corrections, for example, has psychiatric personnel to deal with the offender from his conviction, through imprisonment and parole, to his release. The Youth Authority's two reception centers provide psychiatric evaluation as a basis for placement in a special facility. The Department of Education encourages inclusion of mental health in the school curriculum, provides consultation on mental health to educators and fosters increased use of school psychologists and social workers. The Bureau of Vocational Rehabilitation, under the Department of Education, includes psychiatric services for selected, physically or mentally handicapped persons. The Mental Health Unit in the preventive medical services division of the State Department of Public Health offers consultation to local health departments as well as to the rest of the State Department of Public Health. Since recreation and group-work may conserve and improve mental health, the State

Recreation Commission encourages programs in hospitals, camps and other institutions; it also helps to create or expand community recreation programs. The State Department of Social Welfare utilizes mental health principles in the course of state-level consultation and supervision of local public assistance programs, foster home care and adoption procedures.

The combined approach considers the individual (ill or healthy) simultaneously as an individual and as a member of a family or larger social group. That is, the approach of psychosocial medicine to diagnosis, treatment and prevention is based upon the following assumptions: (1) Mental illness and health are relative to a hypothetical norm in a bio-psycho-social frame of reference; (2) biological, psychological and social components in either mental health or mental illness cannot be dissociated in considering either the causation and prevention of mental illness or the preservation of mental health; (3) the dynamics of personality are conceived in terms of the individual's continuous interaction with a social reality; and (4) mental illness or health is specifically determined by individual biological and psychological forces, but the social reality, including the psychological environment, may support or hinder the integrative forces within the personality.

GUIDING PRINCIPLES AND PRACTICAL CONSIDERATIONS

If the individual and his personality development cannot be separated from his social reality, the combined approach to a mental health program suggests practical considerations and some guiding principles:

1. Inclusion of both treatment services for individual patients and preventive services for groups of potential patients (for example, protection of the mental health of children and youth);
2. Recognition of multiple causation in both the production and prevention of psychiatric disorders, as well as in the conservation of mental health;
3. Joint responsibility of all levels of government (federal, state and local) for the establishment of mental health services, preventive and therapeutic;
4. Sharing or distribution of the costs of mental health services by those individuals who are directly served (through fees), by the public (through community chests and taxes), and by professional volunteers offering services without cost;
5. Local autonomy in both initiating and administering mental health services whether through local government or on some other basis;
6. Flexibility permitting wide local variations in program, so that each program may fit the special local conditions to the greatest possible extent;

7. Coordination and integration of efforts now scattered throughout different public and private agencies and professions, into a well organized program having mental health as a primary, rather than a merely secondary, goal;

8. Equality of opportunity for all citizens to secure services, both preventive and therapeutic, and to pay for these services according to their financial ability;

9. Recognition of the fact that administrative responsibility and financial responsibility do not necessarily go hand in hand;

10. Acknowledgment that scientific answers will always be incomplete no matter how long action is delayed; therefore, program evaluation and research should be included in programs for mental health services. (For example, the Department of Mental Hygiene, with both professional and financial help from the National Institute of Mental Health, is currently evaluating hospital and clinic treatment in comparable psychiatric cases);

11. Avoidance of false claims and over-selling of programs without minimizing the needs or problems encountered.

2900 Buena Vista Way, Berkeley 8.

For Your Patients—A number of specialists have asked that a slight copy change be made in Message No. 1. This has been done and now Message No. 1A is available as well as Message No. 1.

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Consequently, I thought it would be a good precaution if—on this gummed paper which you can paste in your telephone book or in your medicine cabinet—I listed numbers where I can be reached at all times. Also, the number of a capable associate as an added service. Here they are:

_____ OFFICE	_____ HOME	_____ MY DOCTOR
_____ OFFICE	_____ HOME	_____ ASSOCIATE DOCTOR



Sincerely,

_____, M.D.

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Child Development

Problems of Discipline, Authority and Rebellion

J. P. KAHN, M.D., San Francisco

THE EARLY EXPERIENCES of a child have a decisive influence upon the kind of person he will grow up to be. Paramount among these is the discipline and authority to which the child is exposed, designed to enable him to conform to the demands of society and group living.

The purpose of this presentation is to discuss broadly the problems of discipline, authority, and rebellion, as they exist in our culture, as well as some of the determinants of their origins, development and derivatives as they impinge on the child in his striving toward adult independence, maturity and socialization. Authority is something that envelops us from a very early age, first in the form of parents, and later in parent substitutes like teachers. We experience it also in social, cultural and legal pressures. The word itself for many of us has unpleasant associations.

The first demands made on a child are from his parents and the family as a whole. But society, too, molds the child from birth on. This is because the parents apply the educational patterns of the society they live in. In their own personalities, they represent the character of their society or class. They transmit to the child the spirit and values of a group by being representatives of that group. In this sense, the family is the authoritative agent of society. Society, however, itself contributes to the aggressions and confusions which parents face in children and in themselves. One reason for this is that society produces for its children one set of values in school, home and church, and another set in the competitive world they face outside.

For most children, the discipline associated with bowel control is the first discipline to which they are exposed. The child reacts to this as a limitation of the freedom which he has previously known—which of course, it is.

Eliminations and the regularization of them present the child with life tasks that may create persistent needs. It is easy to forget what a profound physiological disturbance this whole business of bowel and bladder training imposes on the child. The physiological processes of elimination are ex-

• It is only through the love and approval of the significant adults in a child's life that he is able to give up his primitive behavior for that which meets the demands of social living. Conflict over authority is only one of many conflicts. There are conflicts which arise inherently in a child's development. The task of the parents in the education of the child in our society is to enable the child to tolerate a certain amount of frustration and also a necessary degree of control of impulses so that he can live in a group and in conformity with the required standards.

Increased rebelliousness and defiance are normally characteristic of certain periods of development in healthy children. These are when concerted discipline begins, and in early adolescence. But other events also may reactivate or stimulate attitudes of defiance and rebellion. Even in his rebellion, a child needs and expects his parents to stand for order, as well as for love. He expects that the parent will save him from the consequences of his own destructive impulses, which he as yet may not have the strength to withstand.

Deep-seated or submerged factors in the parents may play a significant role in the discipline to which they subject their children. True permissiveness means allowing a child to develop according to his own rate of speed and his own potentialities as a unique individual. It includes refusing the child any type of behavior that will bring danger to him or to others.

A parent who uses harsh and rigid forms of discipline may force a child into submission, rather than acceptance and understanding. This produces only surface conformity which hides insecurity and violent underlying destructiveness.

temely well organized, so that automatically the muscle sphincters of the bladder and the rectum respond to accumulated pressure within. When toilet training begins, the child is asked to surrender this physiological autonomy. Instead of functioning in accordance with his needs, he is asked to inhibit the sphincter muscle response to pressure, responding instead to an external stimulus—vessel, place, and so on—presented by the parent or other adult. Moreover, he is asked to respond at a fixed time—not infrequently whether he needs to or not. In this training, the child is expected to subordinate his processes to outside events and times, giving up his own body autonomy, often months before he is

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sufficiently mature to make such an adjustment. Maturity does not mean chronological age, or weight or size; it means that the child has had enough of an activity, such as sucking or unrestricted elimination, to be able to go on to something else without a persistent feeling of deprivation or an unsatisfied infantile longing.

The way the child adjusts to this first discipline will be important for the attitudes and behavior toward authority that he has in later childhood and adult life.

His reaction to this discipline and his willingness to submit to this limitation will depend in great measure on his relationship with his parents. It will depend on how he feels about them and on how important the continuation of their affection and approval is to him. It will depend on whether he feels that what the parents are asking from him is right and reasonable and for his own good. The emotional tone or attitude of the parents is the important thing, not their actions, for the child will react to the tone or attitude and will feel any tenderness or overemphasis or dislike in the parent's voice and handling. The importance of the manner and tone of voice lies in the child's feeling that he is being deprived by this training. Any anger or impatience then may become an occasion for him of anxiety and feelings of guilt.

Many adults may carry over from their own childhood a feeling of anxiety or disgust at feces, so that they are not able to treat the child under their care without emotional strain when faced with this process, which for the child is entirely normal, and unconnected with unpleasant emotions, until adult interference begins.

The child's reaction to this discipline will depend also on whether his body growth at the time the demand is made has advanced sufficiently for him to be able to comply. If training demands are made before the first year, the child's muscular control is just not yet ready for this task. Demands that cannot be met will simply result in frustration for both child and parent. So there will usually be some hostility and rebellion, open or hidden, to this first demand for control, but most children will emerge from this first experience in discipline—that of bowel control—feeling that their sacrifices in attaining control have been well repaid by the parents' approval.

A child who does not have parental affection, or on whom the demands are made prematurely, feels outraged and cheated at having to give up part of his freedom without getting anything in return.

Of course, children can be taught to conform under fear of punishment, but learning through fear is not economical; since it brings no pleasure, the child relapses easily or fails completely.

The effects of training a child too early or too severely are seen regularly in both the pediatric and psychiatric clinics.

Constipation, diarrhea and other intestinal complaints are the psychosomatic illnesses that may be induced by interferences with this phase of growth. Stubbornness is a common result of the parents' efforts to force their will on the child; this sometimes develops even to the point of the child's not talking; of his being verbally constipated. Or the child may be made unduly anxious over dirtiness and become a slave to cleanliness for the rest of his life. Or he may become so preoccupied with his body functions that there is no psychic energy left for a productive life.

During this stage of growth and development the mother, who was at first only the good indulgent provider, has to become the interpreter of society's demands. This means she must not continue to give in to the child's primitive wishes. She *must* frustrate him to an extent, to be a good mother.

Consciousness of the excretory functions presents the child with a dilemma. As was previously mentioned, the child has none of the feeling of revulsion for his excreta which the adult has developed. This is a learned reaction. To the child, his stool is part of him—something he has produced, his own creation. The odor, texture and color are not unpleasant to him. He prizes it. His mother's attitude has made him believe that she also prizes it. She implies this by her pleasure when he has a bowel movement and by her concern when he fails to do so. This is even more pronounced when toilet training actually begins.

The mother's behavior is confusing. She asks for the gift; praises him for giving it, as if it were highly prized, and then proceeds to flush it down the toilet.

Now if a woman asked her husband for a diamond necklace and then when her husband gave it to her as a proof of his love, she treated it in a similar fashion, the husband's anger and surprise would be considered justified. To the child, the mother's attitude toward his bowel product is just as confusing. Sometimes the child will indicate this concern by throwing toys and other objects into the toilet and then try to retrieve them, as if he were trying to solve the riddle by finding whether it is possible that this apparent disappearance of the object might not actually be a matter of its being stored away, to be retrieved at will.

His control over his bowels is significant to the child from another angle. It is dramatic evidence of his increased power. He is now in a position where he can either give or withhold. This gives him a realistic sense of his own strength. With this capacity to control his excreta, the child has a tool for direct attack upon the parent, and thus a means

of expressing his hostility. Many parents express such eagerness to have toilet training completed that the child recognizes that at last he has found the parent's Achilles heel.

As was mentioned, the confusions of this period may be manifested in different ways. A child may develop pronounced constipation. One child had no bowel movement at all for two weeks. When placed upon the toilet, he would say: "I won't give it to you! I won't! Go away!" A child may refuse to comply with a schedule. He will not urinate or pass a stool as long as he is on the toilet but will soil himself immediately afterward. He may hide the feces, or smear it. He may develop diarrhea, so that the movements are beyond his control. There may be many reasons for this kind of behavior. The child may not understand what is wanted by the parent. He may be trying to avoid the destructive attitude the parent manifests toward the "gift" by withholding his feces, or hiding it in secret places. He may be unable to give up the narcissistic gratification the product of his creation offers. He may be expressing hostility toward the parents, which may have its origin in the requirements of toilet training *per se*, or the parent may be asking him to forego too many *other* primitive pleasures at the same time, thus arousing a defensive anger in the child. Perhaps the entire emotional relationship with the parent has been frustrating to the child, as a result of which he is hostile. Maybe the child for some reason is not willing to relinquish the helpless state of infancy, and is therefore resistant to taking over the responsibility of controlling his behavior. Maybe the child would rather be powerful than loved. The point of all this is that because of the physical and emotional demands of this period, it is not infrequently a confused and angry and stubborn and resistant period, with temper tantrums and general behavior indicative of rebellion, and difficulty in conforming to parental demands. Even in yielding, a child may repress his mounting anger toward a parent who demands what the child does not wish to give, but what he dares not refuse.

In any event it is, significantly, during this phase of development, when demands are first made on the child, that an attitude to authority is formed. It is during this stage that the roots are laid down from which develop the child's later attitudes and responses to discipline and authority, even to those of his adult life. The reaction continues in later life as an attitude to anyone or anything which makes demands of him.

In learning bowel control, and also in learning concomitantly control in other areas, the child grows and can accept limitations only through his

relationships with adults. It is only through their love and approval that he is able to give up his primitive behavior for that which meets the demands of social living. If the love is real enough and strong enough, and the discipline used by the parents fair and just, the child does grow. He gives up his untempered behavior and accepts the social need for conforming, to a reasonable degree. We see, then, how discipline starts and an attitude to authority is significantly influenced by the social need for controlling a physiologic function.

In our culture, the final authority figure is almost always a man. It can be a priest, a soldier, a judge or a president. In the family, however, the first authority is the mother. It is she who does the disciplining in the early years. When the child is able to use and understand language, the father then usually comes in as a disciplinarian. The mother will say, "I will tell your father when he comes home." This becomes more frequent as the child gets older. Gradually, the father comes to supersede the mother as the one who administers discipline. When the child is around three or four years old, the father becomes quite important in matters of discipline and authority. By that time, all the early feelings and reactions of the child toward the first authority, the mother, are transferred to him. So we see that the figure of the male authority has behind it the more primary one of the mother. All the defiance, rebelliousness and resistance originally was directed toward the mother in her attempts to make a social being of the child. It is interesting to see that, in journalism and the movies, there is a great deal of acknowledgment of the partially hidden female behind the figure of the male authority. For example, we are always interested in knowing about the mothers and wives of our presidents.

As a child grows, he is increasingly subjected to the socializing process. This is necessary if he is to be able to live in a social group. The demands of the socializing process make it inevitable that his parents will frustrate the child in a number of areas. There are many things he cannot be allowed to do. This is both for his benefit and the benefit of others. The child will react to this with hostility, aggression and rebellion, just as he did earlier. A conflict may arise because of the child's fear that the expression of these feelings will cause him to lose his parents' love. Because of this reaction in their children, some parents may feel anxious at limiting their behavior. But frustration is a very relative thing. There are unavoidable frustrations without which nobody would grow up to be a social human being. There are also frustrations imposed through false values by parents.

Discipline, of course, should be for the child's sake, not for the discipline's sake. It is well known that the things learned first and earliest are the most important and the longest retained. Since parents are the first authorities in the life of the child, the way they handle the problems of discipline are of crucial importance in the later attitude of the child toward authority. As the child gets older and the authority of the parents is replaced by that of teachers, bosses, political leaders and so on, the attitude toward authority learned from the parents will largely determine his reaction to these others.

The way a parent presents the issue is important. Was it explained to the child and was he included in the issue, or did it appear to him as unintelligible, arbitrary and overwhelming? Did the parent say: We are doing this or we are asking this because we are concerned about you? Or did he just say to the child: This is the way it is! Was the discipline based on a rigid set of conventional rules or were the parents guided by the desire to help the child in his attempts to grow up? Was the discipline handled as a force outside of the child, to which he must submit? Or was it an understandable, assimilable discipline, inviting the cooperation of the child?

Children can stand a great deal of frustration as long as they are sure of their parents' love and as long as they understand somewhat the reasons for the discipline. As long as the discipline has a real purpose behind it, which includes the benefit of the child, perhaps it need not necessarily lead to undue aggression, or only to minimal aggression. But almost invariably, children will react to a limitation of their freedom with a certain amount of hostility and aggression expressed in one way or another.

Parents should not blame themselves for all the defiance, rebellion or other difficulties of their children. For one thing, parents have had their own parents, who have significantly shaped their character structure, including the way they react to and handle their children. The concept of blame is neither realistic nor fruitful. An erroneous conclusion is that if a child were properly brought up, he would have no emotional difficulties. But conflict over authority is only one of many conflicts. There are conflicts which arise inherently in a child's development. For parents to understand these conflicts may be a help in tolerating their children's difficulties. This understanding may ease the guilt of parents who feel responsible for their children's troubles. It may enable them to deal more wisely with transient problems and so lessen the risk of the child's rebellion and defiance turning into settled attitudes.

Childhood is a time of growing and becoming. There are no shortcuts in growth. Certain changes

have to be lived through by children—and by parents. Knowing this and accepting it makes it easier—sometimes—for parents to live through periods when children can be extremely exasperating. While it is not possible to give parents a blueprint that would tell them how to handle each specific problem in a specific way, we can give to parents and educators a basic understanding of the child's emotional struggles and a dynamic orientation toward the problem of discipline. The task of the parents in the education of the child in our society is to enable the child to tolerate a certain amount of frustration and also a necessary degree of control of impulses so that the child can live in a group and in conformity with the required standards. Parents who themselves do not accept and are unwilling to conform with the standards of our society are unable to achieve this in their children. Particularly difficult for the child is a situation where each parent takes a different attitude. In such a case the child behaves as if pulled all the time in opposite directions.

At all times, it is well to remember that every child is an individual and proceeds at his own pace.

All children at one time or another and in one way or another are rebellious and defiant. Some children are decidedly so throughout the whole of their development. It becomes their characteristic way of responding to all adults and authorities. The extremes of this are delinquent children and habitual adult criminals.

Increased rebelliousness and defiance are normally characteristic of certain periods of development in healthy children. These develop in the second and third years of life when concerted discipline begins, and in early adolescence. But other events also may reactivate or stimulate attitudes of defiance and rebellion. Circumstances which cannot be helped may cause increased resistance to authority. Examples are financial trouble in the family, the birth of a new baby, the illness or death of a loved adult. Merely being the oldest or the youngest child may contribute to resentments and frustrations, leading to increased rebellion. An example may be an older child who is expected to devote too much time to his younger brothers and sisters, or a younger child who has to submit to the authority of an older brother, as well as to the parents. The interplay of different children in the same family may enhance the normal tendency to rebelliousness. The particular child may not be able to solve the problem in any other way than by this increased rebelliousness. Because children of the same family are different, and because they do have different meanings for their parents, jealousy between them does exist and may be manifested by rebellion.

There are underlying motives common to all rebellion, but there are also many individual meanings. Rebellion may be used to deny the existence of authority. An example is the small child who blithely contradicts everything his mother or father may say. At all times, defiance and rebellion may be used to see what one can get away with; what the limits really are. An ordinary example is that of the small child who refuses to go to bed at his usual time. He is trying to see just how late his parents will let him stay up if they are pressed.

Rebellion is also a means of bringing upon himself the punishment that the child secretly feels he deserves because of the bad thoughts he has. An example of this would be the destructive wishes aroused in a child by jealousy of a brother or sister. The child feels a need to confess; to bring to the notice of the parents these bad wishes, which to him may be identical with the bad deed. Under this kind of stress, the child can feel at ease only if he is sure that his parents know the danger they or others are in from his secret submerged unacceptable thoughts. This need to confess is one of the motives in the small boy for using profane words or, at a later age, for compulsive stealing or destruction of a kind that is bound to be found out.

Rebellion may also be a defense against the fear of parents and other persons. Much of the small child's defiance springs from a need to test his parents; to see whether they are what he fears them to be in his imagination. He wants to know what they will do to him if he actually does become destructive and hostile. A child who destroys his favorite toy may do so because of his need to find out just what his parents will do to him. He wants to know the worst.

Rebellion and defiance may even be used as a defense against all the anxieties which go along with feelings of love. It may be a safety device, directed against a feeling of too great closeness to the parent of the opposite sex. The fear of the adolescent regarding his rivalry with his father may lead him to turn away from home in defiance and rebellion. The little girl's rivalry with her mother may cause her to be rebellious and difficult.

Most of these defenses exist in everyone, but their roots may be more or less deep-seated. Deepest of all in every person are the anxieties arising from the first and primary relation with the mother—from the need and desire for food and love. The infant's needs for affection and nourishment are intense, and the two are indistinguishable to him. He is afraid of losing them. This is the same for him as losing the mother. This is the first anxiety a human feels. Some feeding difficulties, for example, may be due to the child's fear that his taking in food will diminish the supply of affection and nourishment.

It is possible for a fear like this to lead to all kinds of rebellious, obstinate behavior.

Parents will react in different ways to a child's difficult behavior, but it is well to remember that even in his rebellion, a child needs and expects his parents to stand for order, as well as for love. He will be bewildered and frightened by a parent who, perhaps as a reaction against his own upbringing, indulges the child's lawlessness under the guise of permissiveness. What the child expects is that the parent will save him from himself; from the consequences of his own destructive impulses, which he as yet may not have the strength to withstand.

The other part of this attitude in parents appears as a subtle but major resistance to gentle or permissive discipline on their part. It is the fear that any liberal attitude toward the child will permit him to get out of hand. But in fact permissiveness includes refusing the child any type of behavior that will bring danger to him or to others. Usually parents who were themselves dominated in their childhood will have a need to discipline their children in a rigid fashion. Parents may see in their child their own struggle against the unjustness of rigid authority. They had to submerge their resentment against their own parents which was caused by severe discipline. So they subject their own child, as they were subjected, to strict policing. We see, then, that deep-seated or submerged factors in the parents may play a significant role in the discipline to which they subject their children.

There may be times when all parents use fear or other coercion in shaping their children's conduct. All may find themselves in positions in which they threaten and scold, bribe and punish. This is mostly not good. But there is no reason to expect parents to be perfect. There are, however, better ways than fear and coercion. If a child loves his parents, he will, without even thinking about it, want to please them, and he will do many things because doing them wins approval. Gradually he will learn that these things please him too, and he will do them for that reason. In time, the parents' standards will become the child's and it will be his own developing conscience that guides him.

When all is said and done, whatever devices are used to get obedience, to enforce discipline, are pretty unimportant compared to the attitude brought to bear on the situation. The general attitude, or feeling-tone in the family is extremely important. Competitiveness and perfectionism and unreasonable expectations interfere with permissiveness. Permissiveness means allowing a child to develop according to his own rate of speed and his own possibilities. It means that the parents realize that he is a unique

individual. But because, as we have said, allowing a child to get out of hand is frightening to him, it is important for a parent to maintain authority—the authority of a person who loves him; who is just; who the child can see is just; the authority of a person who is fair with him; honest with him; understanding of him. For a parent's secure authority is the rock on which for a long time the child must lean.

A parent who uses harsh and rigid discipline may force a child into submission, rather than acceptance and understanding. Such parents are seen by the child simultaneously as the providers of one's physical needs and also as capricious, usually inconsistent arbiters of punishment. The relationship between such a parent and the child will usually be lacking in genuine affection. The pressure to conform to parental authority makes it difficult for the child to express his aggressive and other instinctual forces in a constructive fashion. The result of this sort of background in a child may lead to a personality which is both narrow and rigid. A person like this cannot give love because he received little. And it is unlikely that he can give of himself in any other creative activities. For this to be different, more affection and more guidance on the part of the parents is needed. Since the child of harsh and rigid parents gets neither affection nor guidance, he often may be either too inhibited, or delinquent. These are opposite sides of the same coin. The delinquent person has not acquired enough internalized controls to limit his aggressive feelings to a socially acceptable degree. The inhibited person is so afraid of his feelings breaking loose that he keeps a rigid clamp on them, usually by denying their existence. Sometimes they break loose anyway. The example that comes to mind is the parson in Somerset Maugham's *Sadie Thompson*.

The necessary internalized controls can occur only as a result of a good relationship between a child and his parents. The child hears his parents' voices saying: Don't do it; I won't love you if you do. Because the child loves his parents and because their love is important to him, he pays attention and accepts the limitations. As he grows older, the child says these words to himself—even in the absence of the parents. This is how the conscience grows and this is what we mean by conscience. At an extreme level, there may be a failure to develop any conscience at all. In this case, we have an asocial, destructive person. In psychiatry, we know this kind of person as the psychopath. He is the individual who cannot delay the pleasures of immediate gratification and lives only for the moment. He has no built-in restraints.

We can go further in examining the developing personality structure. The child with harsh and rigid parents may take over their attitude toward power and control. He has their basic contempt for the allegedly inferior and weak. This of course is but a reflection of his parent's attitude toward him. He feels hostile himself because of his early experiences, and has come to expect from others what he has learned from his parents—that they will be unkind and frightening. His real attitude toward life is one of fear, and his approach to people, therefore, will be to exploit them for his own ends. A child who is forced into an apparent submission to parental authority will develop hostility and aggression to an excessive degree. These feelings will be poorly directed. The feeling of hatred is frequently attached to minority and other unpopular groups. A child who does not have to submit to stern authority does not need to assert his strength against those who are weaker. The child who is forced into fearful submission develops into a punishing person. This mirrors the kind of discipline to which he himself was exposed. As he grows into an adult, he has a rigid attitude because this keeps his rage and insecurity under control.

Much of the feelings that originated in the relationship of the child to a harsh, rigid parent are covered up over the years, but may show up in violent opinions about say, political leaders or foreign countries, which may fulfill his need for a whipping boy. People like this distort even factual knowledge. It is for this reason that information *per se* does not necessarily lead to greater tolerance.

Rigid discipline can sometimes be masked. Someone has said that children learn to walk so that they can walk away. This is as it should be. But there are parents who seem to be concerned and sensitive to their children's needs, when actually this hides a determination to control them and to keep them always children. The child may be given everything—except the right to grow up, to develop to the point where he can be free and independent, can walk away. The result here, too, will be a fear of authority. Authority to the child will imply being caught and blocked in his desire for growth.

From the standpoint of society, a child's attitude toward authority is an extremely important problem. As we can see, forced submission to authority produces only surface conformity which hides insecurity and violent underlying destructiveness. This is dangerous to the very society to which there seems to be this conformity.

In contrast to this fearful person, the child with permissive, affectionate, unthreatening parents will have a permissive and trusting attitude toward others. He will look at the world as friendly, rather

than dangerous. He will expect affection from others, and will be less interested in acquiring power over them. He can give affection because he has received it. He fears punishment and retaliation less. He is better able to identify with the aims of the society in which he lives. He has the help of his parents in working out the problems of sex and aggression. Because of this, he is able to use his energies for creative and socially useful purposes. He is more flexible and sees people as individuals rather than types. As a result he is less prejudiced.

He is able to express disagreement with his parents in an open fashion. This results in a much greater degree of independence from them and from authorities in general. Such a child is far more likely to develop into a person with the qualities we think of as belonging to a mature person. Such a person will be able to love and to work productively. He will be interdependent, rather than childishly dependent or unrealistically independent. And he will not need to dominate or exploit other human beings.

Stanford University School of Medicine, San Francisco 15.

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The Child's Sexual Life

A Consideration of Clinical Implications

JOSEPH D. TEICHER, M.D., Los Angeles

THE MERE FACT that a child has a sexual life, although not in the adult sense, poses problems for child, parents and society. The child has his own reactions to his sexual feelings and behavior, his parents react to the child's sexuality and to the stirrings this makes in them, and our society has its codes, ethics and current teachings. The complex interaction of all these factors has much to do with the child's eventual heterosexual adjustment.

For the child and infant, sexuality is a rather general, pleasurable excitation; not a specific, genital stimulation. The infant's and child's life has been termed bisexual, and there is evidence that both boys and girls produce estrogen and androgen in small quantities. There is evidence that female sex hormones may influence the male embryo, which may account for a varying degree of bisexuality at birth. Also, through lactation and physical care, a mother conveys many influences, which for the girl are in the direction of appropriate later psychosexual development. However, for the boy, the result is to intensify the feminine component in him. One 2-year-old boy may be characterized as a "real boy," independent and assertive; another as a "sissy," afraid of any new step. Of course, this need not be solely the consequence of hormones.

More specifically, one sees congenital conditions such as hypospadias, undescended testicles, or rarely, hermaphroditism. Such conditions may require special treatment and focus attention necessarily upon the genital area. The treatment may involve injections or surgical operation, and the end effect on the child's personality and sexual life depends upon the cause, the degree of the defect, and the age at which treatment is carried out.

Disease or injury leading to hypogonadism; any injury to the genitals; dermatologic conditions or infections involving the genital area, like itching rashes or discharges, certainly focus attention and treatment on the genital area. Operation and instrumentation like cystoscopy and passing sounds have their effect, too. Nor need the operation be

• A healthy sexual life begins in childhood, and the groundwork for later difficulties also begins in childhood. For the child, sexuality is a rather general, pleasurable excitation, not a specific genital stimulation. Excessive attention to the perineal area, operation upon or injury to the genital area and injections are vicissitudes which may have an unhealthy influence on later sexual development. Healthy and informed parental attitudes are the key here, just as they are in the normal exhibitionism, curiosity and intense emotional attachments to parents. Parents infect children, healthily or unhealthily, with their attitudes. In healthy growth exhibitionism and peeping become transformed in socially acceptable ways. In unhealthy growth, either perversions or strong reactions like over-modesty or shame result. Masturbation is common and transitory in most children. Parents, and especially pediatricians to whom parents turn, have a golden opportunity to direct healthy growth by being well informed about the infant and child's sexual growth and thus be enabled to advise upon or manage the common developmental phenomena with good commonsense and patience. Infants and children do not enter the world possessing the morals, standards or inhibitions of adults.

limited to the genitourinary area; any operation at certain stages of the child's growth may have an effect far beyond the removing of, say, diseased tonsils or a necessary circumcision.

Hypogonadism, whatever the cause, is due to a deficiency of gonadotropin, which causes failure of the gonads. In severe cases, it may lead to eunuchoidism. Diagnosis and indicated treatment is always the province of the pediatrician.

What are the psychological consequences of the hypogonadism? It is reflected in the boy's personality, which is described as neutral or asexual, rather than feminine and boyish. Girls tend to be "sweeter," more girlish and therefore less noticed in a group, while a boy is often the center of hostile attention. Puberty, particularly, is the time when hypogonadism becomes painfully obvious and sets the lad apart from his group.

His adjustment depends on his capacity to adapt to his own inadequacy, which may be very difficult when the environment is unsympathetic. The family

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is all too often ashamed of the lad, who already has a sense of shame accompanying his sexual inadequacy.

There is a kindred condition, which can be labeled "pseudo-hypogonadism, parental anxiety type," which is not a true condition of hypogonadism but usually a delayed maturation in a boy at puberty. Parents are convinced the lad should be taller and his genitals more developed; no reason or explanation influences them. They will do the right thing by their boy, whether he likes it or not, or the physician likes it or not. Sooner or later they find someone addicted to giving endocrine shots, quite honestly believing in the wisdom of this. For example, Jim was a short, plump lad in early puberty. His parents were short and plump. They were determined their Jim was going to be a "typical Californian"—a rugged six-footer. They found someone who shared their concern and Jim received a vigorous course of appropriate endocrine therapy. Poor Jim then had overly developed genitals and very sore buttocks—and was not a whit taller. Confused and apprehensive, yes; but not taller. And his parents, although disappointed, were so proud of the new tangible evidences of Jim's masculinity that, were it not that our society frowns upon ostentation of some kinds, they might have called attention to the distinction, much as proud parents show off a child's particular talents.

Excessive therapeutic attention to the perineal area in the form of bathing, applying lotions, scratching, irrigation and poulticing are often stimulating and seductive in effect. All pediatricians have known mothers to complain that their children liked to be bathed and patted in the genital areas long after the illness that demanded the treatment had passed. Depending upon parents' attitudes toward this activity, either this passes or unhealthy consequences result from punitive, repressive measures.

Any surgical operation, instrumentation or injury to the genital area becomes woven into the sexual fantasies of the child and is very often conceived of as punishment for wicked or forbidden thoughts, wishes or deeds. Injections, too, may become frightening and punitive. To repeat, the operation or injury need not be to the genitourinary area; it can be anywhere in the body, although the limbs, the throat and the eyes have a more special psychological significance.

For illustration:

Bobby, nine years old, had an extremely tight prepuce and circumcision was definitely indicated. However, Bobby had been thoroughly indoctrinated by his mother with the following: "You must not

let your penis ever get dirty. It will get infected and rot. If you touch it, eventually it will fall off, or it will be necessary for the doctor to operate on it."

Lo! His worst fears were confirmed. He had done just what he had been warned not to do—and circumcision was the punishment. Fortunately, the surgeon recognized Bobby's real terror and psychological help was given to both the boy and his mother before the delayed necessary operation was done.

And Chico. Chico was an 8-year-old boy who was always "wild and stubborn," according to his parents. They thought he was unusually interested in sex, had "girl friends," suspected much sex play. Their management consisted mainly of threats, bribes, pleading and strict punitive measures, which had little effect. Chico told the author later that he always remembered that his parents said, "You'll get yours; God will punish you." Chico was struck by a car, suffered broken pelvic bones, a ruptured bladder and torn urethra. He was very sick and required extensive operation and instrumentation, including urethral catheterization. He had nightmares, talked wildly in his sleep and thrashed about. Of course, for a time he had good organic reason to be upset; but when he was convalescing his general anxiety was so pronounced that psychiatric evaluation was sought. For him, "You will be punished for the bad things," was grimly realized in the terrible injury he had.

An infant, quite as unabashed as the fabled South Sea Islanders, is without shame or disgust. He examines himself, explores his body openings and his organs. He pats here, tugs there, pulls, and tends to repeat what is pleasurable. There is no concern, no guilt, no anxiety. I have seen parents flush when their babies are being examined and the baby accidentally touches the genital area. The flush bodes ill, for it is well known that attitudes of nasty, dirty, disgusting, and the proximity of the genital area to the excretory organs tend to mix "sex" with "dirty" and eliminative functions. In later childhood and eventually adulthood, that "sex is dirty and nasty" is the foundation of many of the sexual inhibitions and difficulties one sees so frequently.

The growing child, quite without assistance from the outside, has definite anxious reactions to his positive, possessive feelings toward the parent of the opposite sex. Of course by the time he is four, when these anxious reactions are at their height, he has already been infected with parental attitudes about toilet training, cleanliness and body exploring. How the parents regard their "little lovers," as one mother humorously said, and the relationship that has existed between parents and child prior to this crisis of development, determines the later pattern of development—the kind of masculinity and femininity

the child will have—and contributes to the forming of the conscience of the individual.

From the earliest years on, the child has sexual fantasies, ranging from theories of birth and of conception to relations between male and female. Of course, he reacts to his inner life by repressing, by acting out, with anxiety, with guilt, with shame—depending upon his past history and developmental relationships.

Parental attitudes are of great importance, for the infant and child is completely dependent upon his parents and is infected by their attitudes, whatever they may be—permissive, embarrassed, honest, long-winded and inappropriate, too educational and too soon, repressive or disgusted.

The little child is an exhibitionist and he takes great pleasure in displaying his body. In adults display becomes a perversion when not practiced according to the social code. Harsh restraining of the child's natural impulses to exhibitionism are often the foundation of overmodesty, shame or self-consciousness.

The child likes to look. With much pleasure he spends time looking, investigating anything and everything, especially his anatomy. After the age of five or six years he curtails this and feels shame at "peeping," as it is (by then) called. As long as peeping is transformed into social and culturally acceptable occupations like the scientific, artistic study of nude bodies or astronomy or bacteriology or animals, it is permissible and satisfying. Looking assumes its proper directions in life if no restrictions are placed directly on the desire to peep. There is no need to rebuke or punish the small child if he attempts to observe adults on the toilet or to look under girls' skirts. Gentle restraint and distraction are enough; ignoring is even better. This is not to recommend, though, that teachers smile grimly and gamely when an enterprising student attempts to peep—reproving not, diverting not, lest they cause ever so slight a psychic bruise. But it should be borne in mind that severe punishment leads to a suppression of peeping, of curiosity and in some cases to a later repudiation of any attempts to learn by looking. Let peeping continue without brutal reproach and it will eventually be transformed into socially acceptable channels which may vary from watching burlesque shows to more constructive forms of gratification. When curiosity is suppressed and the peeping becomes a gratifying sexual end in itself, the perversion *voyeurism* results.

All of us are cruel to a degree which is displayed in the desire to master and control, and in curiosity. After the age of about six years, the cruelty becomes transformed into sympathy and kindness. Sudden

severe repression of natural desires to control and dominate may make a child afraid, may make him wish not to compete or not to control any situation lest he cause pain. Of course, one cannot allow a small child to be cruel, but an adult need not be cruel to him to make him kind. Aggressive activities and sports do wonders for natural aggressive impulses.

All little girls try to imitate boys; all wish at one time to be boys. Most of them renounce this wish and welcome femininity. Some girls from the earliest years display a fierce desire to be a boy. They will wear only blue jeans or cowboy suits, insist their hair be cut, or even pull out their hair, as did one three-year-old. "I'm a boy," they will say defiantly, and will even insist on a boy's name at times. In most instances the basis of this intense masculine wish seems to be due to the unwitting seductiveness of the male in the family and the patterning of the child after this male. In some instances, "hereditary factors" (which often means we don't really know) seem to be the cause. Such children usually need help in accepting femininity.

Older girls, strongly identified with father, may be quite aggressive and driving and reject a feminine role psychologically, even in marriage. For that matter, boys strongly identified with mother may be quite effeminate, which colors their later adjustment. Where interference with the ordinary course of sexual development is strong, homosexuality may develop in adolescence or adulthood.

Masturbation is common in children, most frequent between the ages of 3 and 6 years. It is transitory. Repressive or punitive attitudes, disgust and shame color the child's reaction and provoke anxiety and guilt and, in extreme cases, apprehension of danger to the genitals. In no area is the parents' attitude and management more important than in the developmental appearance of masturbation. Ignore and distract—that is the code for parents.

A child who has been seduced or sexually attacked presents a special problem, and the manner in which the problem is managed often helps determine the psychic result. Unnecessary dwelling on the episode, unnecessary genital examinations, punishment and dramatic emotional scenes have only a negative value. Where the result is sexual overstimulation or fright or anxiousness, special help may be required for the distressed child. Sexual seduction or attack is a traumatic experience which both stimulates and frightens the child.

As to sex education and parental attitudes: An honest, frank attitude; information given simply and when asked, and in terms appropriate to the age of the child—these are the golden rules. Well-meaning parents who grit their teeth and read books to their children when the parents think it is time, or those

who turn away questions with "You're too young," or those who surround sexual matters with mystery and badness hurt their children. Later those parents wonder why their children do not ask about sex. Something, they think, must be wrong. They should reflect that a child who does not ask, may be reticent because he already has some knowledge and has problems about what he knows. There are techniques of stimulating overt curiosity, and this depends on parental attitudes of honesty and matter-of-factness.

For some time now—the new era—some parents have steeled themselves and grimly paraded nude before their children. This with the notion that so doing will free the child of inhibitions or sexual taints. They should be advised that unlimited parental nudity can have both a stimulating and a frightening effect. (One nine-year-old girl developed a pronounced disturbance of sleep. She was sure a man was coming into her room. Her mother believed in free nudity. Poor father acquiesced. They paraded. All they did not do was to take the nine-year-old to bed with them—they took little sister instead. The elder child was looking for a man under her bed, like the proverbial fearful old maid—hoping.) Parents who leap into the closet lest their children see them undressed are as unnatural as the determined nude paraders. A reasonable degree of mod-

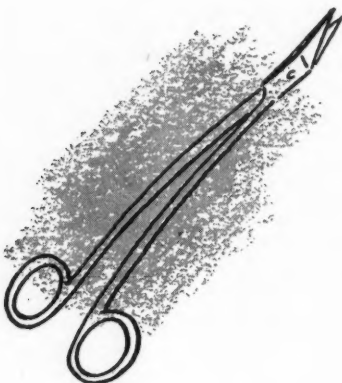
esty and privacy will not be traumatic to the child or the parents. Sleeping in parents' room or in parents' bed is seductive, frightening and a fine way to initiate later problems, including sexual preoccupations and nightmares.

Perversions are not common in children but the groundwork for development of them later may be laid in childhood. Problems like transvestism, fetishism (which occurs only in boys) and homosexuality are difficult and complex in origin. Obscene words are not perversions. They indicate curiosity and daring, and where good taste and common sense prevail, there are no problems.

Symptoms like nailbiting, thumbsucking, tic and enuresis may be—although not in all cases—masturbation substitutes. There is ample clinical evidence to support this statement.

The child has a sexual life and its vicissitudes are colored by the reactions of the child, parents and society. A healthy sexual life begins in childhood. The groundwork for later difficulties also begins in childhood. The pediatrician having closest contact with child and parents has a golden opportunity to help prevent difficulties or guide to proper maturation.

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Control of Insecticide Exposure in Employment

A Guide to Physicians for Dealing with Organic Phosphates

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PHYSICIANS in the rural areas of California are being called upon with increasing frequency to use their medical skills in the prevention of occupational disease as well as in its treatment. Today's technologic advances have placed within agriculture and allied industries an ever-increasing variety of valuable new chemicals, some of which present a formidable hazard when adequate safeguards are not employed.

Organic phosphate (phosphate ester) insecticides, with malathion a notable exception, are among the most hazardous materials yet used as pesticides. Parathion, TEPP (tetraethyl pyrophosphate), and Systox (demeton) are the highly toxic phosphate ester chemicals most widely used in California. It is in dealing with this group of insecticides that preventive medical services for employees are particularly valuable. The knowledge and experience gained by the physician who provides these services can be of considerable value to him in his practice. Phosphate and other insecticide problems are not confined to employees, although as a group they are subject to the most exposure. The careless handling of organic phosphate insecticides cost the lives of four children in California in 1954.⁸

The demand for the services of physicians to provide medical supervision for employed groups working with these insecticides is expected to increase. Not only are employers becoming more aware of the value of these programs, but the amounts of phosphate insecticides used in California are increasing rapidly.

In order to assist physicians who may be called upon to provide these services, there follows a short summary of information on organic phosphate poisoning, diagnosis and treatment, and an outline of the type of services which have been found to be of value in providing medical supervision for employees working with these materials.

Organic phosphate insecticides are esters of phosphoric acid and its derivatives. The only significant physiologic action they have is ability to inhibit or destroy the enzyme acetylcholinesterase. The signs and symptoms of poisoning are primarily the result of the intense stimulation which occurs when cholin-

• Increasingly larger amounts of the highly efficient and highly toxic organic phosphate insecticides, particularly parathion, tetraethyl pyrophosphate, and Systox (demeton), are being applied on California's farms. These insecticides have become an economic necessity to agriculture. They can be used safely when rigid precautions are utilized and when medical supervision is provided for employees regularly working with these chemicals.

The demand for the services of physicians prepared to supply this kind of industrial medical supervision is expected to increase in California.

The basic procedures through which effective medical supervision can be provided are outlined.

esterase is insufficient to destroy acetylcholine accumulating in parasympathetic postganglionic fibers, in sympathetic ganglia, in the central nervous system and in myoneural junctions of striated muscle. The symptoms of parasympathetic stimulation (muscarinic effect) are most easily recognized and usually appear first.

These chemicals can be rapidly absorbed by any route, of which the skin is perhaps the most important. Organic phosphates are not skin irritants, so that usually no discomfort is noted while absorption is occurring. Inhalation of dusts and sprays can be hazardous. Contrary to popular belief, the phosphate ester insecticides either have a low degree of volatility or are so readily hydrolyzed that usually it is not the vapor given off which presents a problem. (The phosphate ester "nerve gases" are, however, highly volatile and have the same biological action as the phosphate insecticides.) On the basis of animal experimentation the minimum acute lethal oral dose of parathion and Systox (demeton) for man has been estimated at 12 to 20 mg.⁶ Animal experiments indicate that TEPP may be somewhat more toxic than parathion.

Poisoning from these chemicals is an acute episode in which the patient is either dead or on the way to recovery in 24 to 48 hours. Sequelae are not expected. Chronic poisoning does not occur in the usual sense, although the effects of repeated smaller exposures to organic phosphates are cumulative when cholinesterase is destroyed faster than it can be regenerated. In these circumstances, the

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steadily declining level of cholinesterase activity produces no symptoms until the critical level is reached. Symptoms may then be noted suddenly after a small exposure.

Weakness, fatigue, giddiness, nausea and headache are usually among the first symptoms. The following train of symptoms and signs may be noted soon afterward (or they may be delayed): Abdominal cramps, blurred vision, miosis, lacrimation, profuse sweating, salivation, a feeling of constriction in the chest, difficult breathing, vomiting and diarrhea. In more severe poisoning, incoordination, mental confusion, oronasal frothing, drowsiness, fasciculations of voluntary muscles, loss of sphincter control, pulmonary edema, cyanosis, collapse, coma, convulsive seizures, respiratory failure and death can follow.

The most significant physical signs are a fixed miosis, excessive secretions and respiratory difficulty. The temperature is usually normal, the pulse is rapid and the blood pressure may be elevated. Increased bronchial secretions and bronchospasm will be evident upon examination of the chest.

The onset of symptoms of poisoning may be delayed, but is not to be expected more than 12 hours following exposure.⁴ TEPP acts more rapidly than the other organic phosphate insecticides, and symptoms often appear shortly after significant exposure. A delay of several hours is more likely to occur after exposure to parathion or Systox.

DIAGNOSIS

Diagnosis is not difficult when the signs and symptoms just enumerated develop after exposure to a phosphate pesticide. Even when information concerning the patient's recent activities is not available, fixed miosis, greatly increased secretions, and respiratory difficulty in an acutely ill person are highly suggestive.

It is in the early stages or in milder cases of poisoning that the diagnosis may be more difficult. Conditions that have been confused with early or milder organic phosphate poisoning are: Heat stroke, asthma, respiratory infection and acute gastroenteritis. Several workers with acute poisoning have been hospitalized with tentative diagnosis of poliomyelitis. Poisoning from pilocarpine, from other parasympathomimetic drugs, and from the mushroom *Amanita muscaria* causes symptoms similar to those brought about by the phosphate anticholinesterase insecticides. (Fortunately, similar treatment is appropriate.)

It cannot be assumed that, just because a person works with organic phosphates, any illness which occurs is due to these chemicals; but it is always

advisable to hold such a patient under close observation until poisoning can be ruled out.

It is important to distinguish between poisoning from organic phosphates and that from other toxic pesticides. There is a variety of potentially hazardous agricultural chemicals unrelated to the organic phosphate group and unrelated to each other in terms of toxicology and treatment of poisoning.

The label on the original container provides the most accurate information about the pesticide to which a person may have been exposed. Regardless of the many trade names under which pesticides may be marketed, their labels must state the chemical or common name of the active ingredient. The following are common and chemical names of the highly toxic organic phosphate pesticides used to any extent at present in California:

Parathion (diethyl p-nitrophenyl thionophosphate)

Methyl parathion (metacide) (dimethyl p-nitrophenyl thionophosphate)

TEPP (tetraethyl pyrophosphate)

Systox (demeton) (diethoxy thiophosphoric acid ester of 2-ethyl mercaptoethanol)

OMPA (octamethyl pyrophosphoramidate)

EPN (ethyl p-nitrophenyl thionobenzene phosphonate)

(Malathion, chlorthion and dipterix are examples of newly developed organic phosphates of a much lesser degree of toxicity than those listed above. Trithion is a new phosphate pesticide of a moderate degree of toxicity. Thimet and phosdrin of high toxicity have also been recently introduced.)

The toxic organic phosphates are not marketed for household or garden use. A permit to purchase and apply them must be obtained from the County Agricultural Commissioner. His office may be able to provide information regarding the identity of a pesticide to which a patient may have been exposed.

Plasma and red cell cholinesterase activity determinations should be done for anyone in whom symptoms from exposure to organic phosphates are suspected. These tests are not only useful in confirming a diagnosis, but are necessary in order to advise a patient who works with these materials. Until cholinesterase has regenerated, he is particularly vulnerable to further exposure. The physician usually cannot wait for the result of the test before beginning treatment, however.

TREATMENT

Acute poisoning from phosphate ester pesticides is an extreme medical emergency. Lethal doses of these chemicals can be counteracted when treatment is applied early and vigorously.¹ Atropine is the physiological antidote. It acts by blocking the action of excessive acetylcholine. The dose, route and interval between injections is determined by what is necessary to keep the patient mildly atropinized for

the duration of symptoms. Repeated doses of atropine, much larger than the usual therapeutic amount, are required in acute poisoning and the intravenous route is recommended. For severe symptoms in adults, an initial dose of as much as 4 to 6 mg. of atropine sulfate is indicated. Maintenance doses of 2 mg. may be necessary at hourly or shorter intervals. For moderate symptoms an initial dose of 2 mg. is recommended, with lesser maintenance doses as required.³ Favorable response to one or more injections of atropine does not guarantee recovery. Treatment must be continued throughout the emergency. However, the need for atropine after 48 hours is not usually expected. Contraindicated are theophylline, aminophylline, chlorotheophylline and morphine.⁶

When a severely poisoned patient is cyanotic, artificial respiration, preferably by mechanical means, should be started first and atropine given as soon as cyanosis is overcome.⁶

The patient should be decontaminated quickly by removal of clothing and bathing with soap and water to which soda or mild alkali has been added if available. The person carrying this out should wear gloves and the contaminated clothing should not be handled or shaken out. Gastric lavage is indicated if there is any indication that the insecticide has been ingested. The patient must be observed constantly. Equipment for artificial respiration and oxygen administration should be at the bedside. The need for it may arise suddenly.

Excessive bronchial secretions should be removed by whatever methods are appropriate—postural drainage, aspiration with a catheter and syringe, endotracheal intubation or tracheotomy. Giving fluids intravenously is contraindicated while there is excessive fluid in the respiratory tract.

Continuous observation and appropriate amounts of atropine are also important for patients with milder symptoms. It is not possible to predict whether more serious symptoms will follow. It is not safe to administer atropine and permit the patient to go home. Persons with no symptoms but who may have had significant exposure should be examined and held where they can be observed.

The minimum lethal dose of atropine has been reported as about 10 to 20 mg. for children and 80 to 130 mg. for adults.³ Rarely, sensitivity to smaller doses has been reported. There is a good margin of safety between the therapeutic dose for organic phosphate poisoning and the fatal dose.³ Persons with this kind of poisoning have an increased tolerance for atropine.

Atropine can precipitate an incipient glaucoma. Therefore, if suspicious symptoms referable to the eyes develop following treatment for organic phos-

phate poisoning, the patient should be seen by an ophthalmologist.

Atropine has no significant effect on cholinesterase activity and does not affect the validity of laboratory tests. By blocking the action of acetylcholine, atropine can control most of the symptoms of poisoning. It is not a specific chemical antidote acting to free the cholinesterase chemically inactivated by the phosphate ester pesticide.

Reports of recent experimental work indicate that specific antidotes may soon be developed, but none are as yet ready for use in the treatment of human poisoning.

CHOLINESTERASE ACTIVITY DETERMINATION

There are several methods by which cholinesterase activity can be determined. The basis for most techniques is the direct or indirect measurement of the acetic acid liberated in a system where the cholinesterase in a known amount of red cells or plasma hydrolyzes acetylcholine, which has been added in excess. Cholinesterase hydrolyzes acetylcholine to acetic acid and choline. The amount of acetic acid liberated will depend upon the concentration of red cell or plasma cholinesterase.

The Michel electrometric method, particularly the modification which permits the use of fingertip blood, is the most widely used technique. This method provides a practical combination of simplicity with a reasonable degree of accuracy. A potentiometer is used to measure the lowering of pH produced by the liberated acetic acid. The results are reported in Δ pH units per hour. Reliability of duplicate determinations of the same specimen should be within 15 per cent.⁵

The normal range for plasma is about 0.41 to 1.65 Δ pH units with an average of 0.91 Δ pH units. The normal range for red cells is 0.55 to 1.25 Δ pH units with an average of 0.86 Δ pH units.⁷ A person with no exposure to anticholinesterase chemicals shows a fairly constant cholinesterase activity with somewhat more variation in plasma values than in red cell values. However, there may be wide disparity of cholinesterase activity between one unexposed person and another, which can be considered normal. Therefore, in the medical supervision of employed groups using phosphate insecticides, it is more accurate to base interpretation of each employee's periodic cholinesterase tests on his own normal values as determined before exposure to these chemicals.

On the basis of what is known about the reliability of the laboratory procedure and the variation in cholinesterase activity inherent in the individual,^{2,5,7} an arbitrary estimate of significance can be made when red cell or plasma cholinesterase drops to less

than 75 per cent of the individual's pre-exposure value. When the pre-exposure or baseline value is not known, a decrease in red cell or plasma cholinesterase to 60 or 70 per cent of the average for the general population may be looked upon as suspicious. A fairly well established practical standard for determining when a person should be removed from exposure to phosphate ester pesticides is a decrease of either plasma or red cell cholinesterase activity to 50 per cent of "normal," based preferably on the individual's normal value. He should not return to exposure to organic phosphate pesticides until both plasma and red cell cholinesterase have increased to above 75 per cent of his normal. Phosphate poisoning can fairly well be ruled out if red cell cholinesterase is above 50 per cent of the individual's normal or if subsequent serial tests do not show that a decrease of this magnitude has occurred. Symptoms usually do not appear until red cell cholinesterase has dropped to between 25 and 50 per cent of normal. In fatal poisoning, pronounced cholinesterase inhibition (0 to 10 per cent of normal) is the only specific finding.⁴

Plasma cholinesterase is a nonspecific enzyme; that is, it hydrolyzes certain other esters of choline. It is a more sensitive indicator of absorption of organic phosphate chemicals and is reduced earlier than the specific cholinesterase in the red cells. Plasma cholinesterase activity bears no relationship to the cholinesterase of the nervous system, and is affected by certain other chemicals and conditions, notably reduced liver function. Red cell cholinesterase is specific for acetylcholine and bears a relationship to the nervous system enzyme. It is, therefore, an indicator of more serious inhibition and is related to actual signs and symptoms of poisoning. Plasma cholinesterase may be reduced to zero without symptoms, provided the red cell cholinesterase has not dropped to the critical level. However, it is more often the case that red cell cholinesterase also is considerably diminished when plasma values are low. Determining both plasma and red cell cholinesterase provides two kinds of information—one kind helpful in assessing exposure early, and the other in indicating extent of exposure.

In man, it takes about three weeks for plasma cholinesterase activity to recover from zero to normal. Red cell cholinesterase recovers more slowly. At present, there is no method known for speeding up the natural recovery process.

SUPERVISION OF EXPOSED PERSONS

The preventive medical services which a physician provides to a group of employees at the request of their employer are particularly valuable when the physician becomes well acquainted with the nature

and details of the work that the employees do. The fundamental purpose of this type of medical program is to provide a continuing check on the effectiveness of the protective equipment and work methods which are used to prevent exposure to phosphate pesticides.

Although medical supervision is always indicated where employees are regularly using hazardous materials, it has perhaps more to offer where there is exposure to organic phosphates. There are not many of the acutely toxic chemicals used in industry for which there is available both a laboratory test which can help detect excessive exposure before illness appears, and an effective antidote to combat poisoning should an accident occur in spite of all precautions. For employees working with these chemicals, the availability of adequate treatment of poisoning is greatly enhanced when there is a physician who knows the work situation and has made preparations to meet an emergency.

The cost of the medical program is a necessary expense of operation where hazardous materials are used in employment, and is, of course, assumed by the employer.

Although the needs and circumstances of employed groups differ and the approaches to providing medical supervision of them may vary, there are certain basic procedures: They are of two kinds: Procedures requiring particular attention when the program is initiated, and procedures that are carried out on a continuing basis.

Initial Procedures: It is desirable that each employee have a physical examination and that a complete medical and occupational history be taken. Workers who handle hazardous materials regularly should be in good physical condition. The initial examination provides the physician with an excellent opportunity for informing the employee of the nature of the hazard in his work.

Cholinesterase activity determinations for both plasma and red cells should be done on at least two different occasions to establish the normal level for each employee at a time when he has had no exposure to phosphate ester insecticides for three weeks, preferably longer. Where a local laboratory does not regularly perform these tests but is interested in doing so, it can obtain expert advice on the subject from the Industrial Hygiene Laboratory of the State Health Department. A list of laboratories in California known to be prepared to carry out these tests is available on request from the same source.

Prearrangements for managing acute poisoning should be made so that no time will be lost in administering first aid and medical treatment. The physician should carry an ample supply of injectable atropine in his emergency bag. Further, the physi-

cian can provide the employer with instructions on first aid. A copy of these instructions can be given to each employee and posted at the places of work. The physician can designate an alternate or a panel of physicians to be called when he cannot be reached. Because serious symptoms of poisoning may not develop until several hours after exposure, each employee should carry with him the name and phone numbers of the physicians in case he becomes ill while away from work.

Whether or not employees should carry atropine is a matter requiring considered medical judgment. The situation differs among employed groups, both with regard to the distance from medical care and the willingness of the workers to follow instructions. Two tablets of atropine (0.6 mg. each) can temporarily cover up early symptoms of poisoning and give a false sense of security. There may then be a delay in obtaining medical care and, in some instances, the employee may go back to more work with the insecticide. In acute poisoning, oral administration of atropine is of little assistance because of the attendant nausea and vomiting, and the need for larger doses parenterally.

In certain circumstances, letting the worker have atropine to keep on hand for use if needed may help the physician in the differential diagnosis between milder phosphate insecticide poisoning and other conditions. Employees can be instructed to take one or two atropine tablets when any symptoms develop which could be due to these insecticides, and to report to the physician at once. If the patient shows the effects normally expected of atropine, this fact is a point of evidence against poisoning. If, on the other hand, the usual effects of atropine are absent, this is evidence for phosphate insecticide poisoning.

Taking atropine as a prophylactic measure is not recommended.

Continuing Procedures: Cholinesterase activity determinations for plasma and red cells should be carried out periodically for employees while they are regularly exposed to organic phosphate insecticides. The optimum interval for these tests can best be determined by experience with the employed group in question. Intervals of one week or less may be appropriate when exposure is considerable. Where controls are operating well, or smaller amounts of insecticide are being handled, two or three week intervals may be adequate. The period between tests may be different among individuals within the same group of employees.

The cholinesterase activity determinations are of most value when they are carried out and the results reported to the physician within a day of the time the group of workers appears for the tests. It is desirable that the initial report include the method

used and that all reports give the numerical results and the per cent of the individual's baseline value that each result represents. The date and time the blood was drawn should also appear.

In general the interpretation is the same regardless of which of the phosphate ester chemicals or mixture of them is being used. Experienced physicians have worked out various methods of determining at what cut-off levels of cholinesterase activity employees should be removed from exposure or returned to work. However, until a physician gains experience he may be at a loss as to where to start. For this reason, the following scheme is suggested, although it may not prove to be the optimum for some groups:

Satisfactory: When both plasma and red cell cholinesterase activity are 75 per cent or more of the individual's baseline value.

Caution—Showing significant exposure: When either plasma or red cell cholinesterase activity drops to 50 to 74 per cent of the baseline value.

Stop work with phosphate insecticides: When either plasma or red cell cholinesterase activity drops to below 50 per cent.

Back to usual work: When both plasma and red cell cholinesterase activity have risen to 75 per cent or above the individual's baseline value.

A running graph kept for each employee, on which is plotted the results of the periodic cholinesterase tests is a useful device for visualizing trends. Other pertinent events can be included on the graph.

The report to the employer can include the above categories and the names of the employees falling in each, together with any recommendations about the working situation the physician feels are warranted.

When red cell cholinesterase values fall below 50 per cent, it is desirable for the laboratory to report by phone to the physician and for the physician to notify the employer and the employee as soon as possible. Further exposure is hazardous and the worker should be examined by the physician for signs and symptoms of poisoning. It is desirable for future reference to take the opportunity to discover at what level of cholinesterase inhibition the worker shows signs or symptoms. (Miosis and possibly wheezing may be either a local or a systemic effect. If only a local effect, the cholinesterase activity will not be significantly low.)

The workers should, of course, be instructed to report to the physician when any signs or symptoms appear which could be due to phosphate chemicals, or if there is any question of having received a significant exposure.

California State Department of Public Health, 2151 Berkeley Way, Berkeley 4.

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CASE REPORTS

Giant Diverticulum of the Bladder with Gastrointestinal Manifestations

JOSEPH J. KAUFMAN, M.D., and
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IT IS WELL RECOGNIZED that a variety of conditions arising in the urinary tract may become manifest only by production of abdominal or gastrointestinal symptoms. Diverticula of the urinary bladder frequently develop without causing typical symptoms, and are discovered in the course of urological investigation done because of symptoms of lower urinary tract obstruction. In the following case a giant diverticulum of the bladder was not associated with complaints referable to the urinary tract and the clinical and roentgenographic observations were confusing.

REPORT OF A CASE

A 70-year-old white businessman consulted a physician because of long-standing mild constipation. X-ray studies of the upper gastrointestinal tract showed upward displacement of the small bowel and descending colon by a large mass arising in the pelvis and left lower quadrant of the abdomen (Figure 1). An intravenous urogram showed a large, round, "ground-glass" density occupying the entire left lower quadrant of the abdomen. Normal renal function without dilatation of the upper urinary tracts was observed. However, the mid-ureters were spread laterally and the left ureter was displaced posteriorly (Figure 2). Upon inquiry the patient said that nocturia (once nightly) and occasional hesitancy of micturition had been present for 30 years. Questioning elicited no other symptoms suggesting obstructive uropathy.

The abdomen was moderately protuberant. There were no palpable abdominal masses but suprapubic dullness extended over the left lower quadrant to the flank. On rectal palpation, the prostate was noted to be symmetrically enlarged (grade $1\frac{1}{2}$ in range of 1 to 4). It was of soft consistency and regular outline. The consensus of several medical and surgical opinions was that the patient had a retroperitoneal tumor and that exploratory operation was indicated. One general surgeon suggested the possibility of a dilated bladder and requested urolog-



Figure 1.—G.I. series illustrating large bilobular pelvic mass displacing small bowel and descending colon.

ical consultation before operation. To a urologist, the x-ray films and the physical symptoms suggested at once the likelihood of distention of the bladder or a large diverticulum of the bladder or both. A catheter was inserted for evacuation of residual urine and 1,000 cc. of clear urine was withdrawn. Further decompression of the bladder was carried out by releasing 100 cc. of urine through the indwelling catheter every hour. Six and a half liters of urine was removed in a period of 48 hours. For cystography, 1,200 cc. of 10 per cent Urokon® was injected (without causing any sensation of bladder fullness) and the roentgenogram showed a huge diverticulum arising from the left lateral wall of the bladder (Figure 3).

On June 30, 1955, cystoscopy was performed under spinal anesthesia and grade 2 (range, 1 to 4) trabeculation of the bladder was observed. A diverticular orifice was seen on the left lateral wall of the bladder approximately 4 cm. above the left ureteral orifice. The prostate was enlarged intra-urethrally,

From Cedars of Lebanon Hospital, Los Angeles 29.

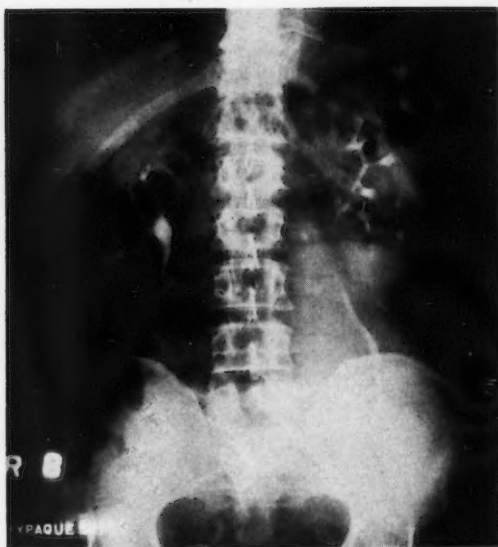


Figure 2.—Intravenous urogram illustrating "ground glass" density occupying left lower quadrant and spreading the ureters.



Figure 3.—Cystogram revealing giant bladder diverticulum corresponding in size and shape to filling defects noted in Figure 1.

grade 1½. Immediately following cystoscopy, diverticulectomy and suprapubic cystoscopy were carried out through a transverse lower abdominal incision extending from the midline to the left flank. The diverticulum, about 15 cm. in diameter (Figure 4), was easily mobilized by dissecting its delicate attachments to the peritoneum and left retroperitoneal area. The diverticular orifice was 3 cm. in diameter. After severing the neck of the diverticulum, the bladder opening was closed in two layers. A midline suprapubic cystostomy was established for postoperative drainage and the patient had uneventful recovery. The diverticulum, when filled, was 17 x 13 x 13 cm.

Five weeks after operation, a cystogram was made. The bladder capacity was 200 cc. (Figure 5).

Transurethral resection of the prostate was carried out August 17, 1955, and 21 gm. of prostatic tissue showing prostatic hyperplasia and prostatitis were removed. The patient made a satisfactory recovery after transurethral prostatic resection. The suprapubic tube was removed on the first postoperative day. Residual urine in the bladder, as determined several times postoperatively, was less than 30 cc.

DISCUSSION

Bladder diverticula probably occur more frequently than is generally recognized. They exist in 10 per cent of men with infravesical obstruction.² There are no symptoms which are pathognomonic of the presence of bladder diverticula. Occasionally "installment voiding" or the presence of a large amount of residual urine, often infected, suggest the presence of a diverticulum.



Figure 4.—View of diverticulum delivered through extraperitoneal abdominal incision.

In the case presented, although the bladder diverticulum was among the largest recorded in the literature¹ it caused no urinary symptoms and only minimal symptoms referable to the bowel. The chief point of interest is the diagnostic confusion caused by the preliminary x-ray films of the bowel and upper urinary tracts.

In the male, a smooth mass arising from the pelvis and extending upward in the midline or to one side, should suggest the possibility of a dilated bladder or diverticulum. A "ground-glass" appearance and smooth contour are further points indicative of a cystic mass of this type. Certainly because of its relative frequency compared to primary retroperitoneal tumors, bladder diverticulum should be considered first in any retroperitoneal mass displacing bowel and seeming to arise from the pelvis.



Figure 5.—Postoperative cystogram.

The absence of urinary symptoms may be misleading but should not eliminate a presumptive diagnosis of bladder diverticulum. Definitive diagnosis is readily made by inserting a catheter to void residual

urine and making a cystogram. The demonstration of a benign condition, such as bladder diverticulum, so readily accomplished, can greatly relieve a physician and a patient concerned about the possibility of a retroperitoneal neoplasm.

SUMMARY

A case of a giant bladder diverticulum causing confusing clinical symptoms is presented. Mild gastrointestinal manifestations were the only presenting complaints of a patient with a large lower abdominal mass displacing the small bowel and descending colon as well as the left ureter. Although the presumptive diagnosis by competent medical and surgical consultants was a primary retroperitoneal tumor, the correct diagnosis was fortunately made preoperatively by catheterizing the patient for residual urine and making a cystogram.

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Sarcoidosis and Renal Insufficiency Resembling Hyperparathyroidism

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IN AT LEAST six reported cases, patients with hypercalcemic renal insufficiency due to sarcoidosis have had exploratory operation because hyperparathyroidism was suspected.^{1,3,8,13} Contrariwise, adenomatous hyperparathyroidism has been reported to simulate sarcoidosis.¹²

In the case reported herewith, the patient had sarcoidosis, with hypercalcemia and nephrocalcinosis, as well as advanced arteriolar nephrosclerosis and chronic rheumatic heart disease with aortic stenosis.

REPORT OF A CASE

In January, 1953, a white woman 72 years of age was observed because of generalized itching and a decrease of 28 pounds in body weight in a period of three years. Progressive weakness and mental confusion had recently precluded her living alone.

When 18 years of age, the patient had had tonsillitis with subsequent ill-defined inflammation of the left lower leg. A few years later she had taken iodine because of an enlarged thyroid gland.

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Submitted September 21, 1956.

In October 1952 (at another hospital) soft tissue calcification was removed from the region of the right shoulder.

The patient was admitted to the Pomona Valley Community Hospital, and upon physical examination was observed to be thin, pale, weak and lethargic. The body weight was 100 pounds. In addition to almost total deafness, the sensorium was clouded and there was a urinous odor to the breath. The patient chuckled and mumbled incoherently. Ocular fundi were normal. The thyroid gland was multinodular. It was enlarged, more on the right than the left. Fine moist rales were audible throughout the lung fields. A systolic thrill was palpable over the aortic area, and a loud harsh systolic murmur along the left sternal border was transmitted to the neck. The blood pressure was 150/100 mm. of mercury and the pulse was regular at 80 beats per minute. The results of neurological examination were within normal limits.

Results of urine, hematologic and chemical studies during 1953 and 1954 are shown in the accompanying table. An electrocardiogram was within normal limits. Although the bone marrow was hypocellular, the condition of it was not such as to permit specific diagnosis.

Roentgenograms of the chest and abdomen showed left ventricular enlargement, osteoporosis of the ribs, two huge calculi in the gallbladder, a calculus in the right kidney and flocculent calcifications in the pelvis. Periarticular calcifications of the right

Laboratory Data in a Case of Sarcoidosis and Renal Insufficiency

	January to February 1953 Preoperative	March 1953 to June 1954 Postoperative	August 1954 Terminal illness
Urine:			
Specific gravity	1.011	1.012	1.011
Albumin	2+	Trace	4+
Sugar	0	0	0
Erythrocytes per high power field.....	50 to 60	Occult positive	50 to 60
Leukocytes per high power field.....	3 to 5	10	40 to 50
Miscellaneous	Sulkowitch (normal range)	Crystals — Calcium oxalate; Bence-Jones protein negative.	Culture— <i>E. coli</i> ; stone passed of oxalates and phosphates.
Hemoglobin (gm. per 100 cc.).....	9.2	9.2	6.0
Hematocrit (per cent)	28	33	.....
Erythrocytes (million)	3.27	2.98	.....
Leukocytes (per cu. mm.).....	6200	5400	9900
Lymphocytes (per cent)	28	16	8
Segmented neutrophils (per cent).....	65	65	78
Banded forms (per cent).....	2	9	12
Eosinophils (per cent).....	5	10	2
Sedimentation rate (Westergren) mm./hr.....	119	110	.....
Urea nitrogen (mg. per 100 cc.).....	65	71	56
Creatinine (mg. per 100 cc.).....	3.5	3.2	7.3
Calcium (mg. per 100 cc.).....	14.8	12	10
Phosphorus (mg. per 100 cc.).....	5.3	5.8	6.5
Alkaline phosphatase (Bodansky units).....	3	4.1	1.0
Total protein (gm. per 100 cc.).....	7.1	6.8	7.7
Albumin (gm. per 100 cc.).....	3.2	3.2	4.0
Globulin (gm. per 100 cc.).....	3.9	3.6	3.7
Albumin-globulin ratio	0:82	0:88	1:3
Miscellaneous.....	Protein-bound iodine: 5.5 micrograms per 100 cc.	Thyroid tissue negative for acid- fast bacilli; tissue extract from node of neck negative for tuber- culosis in guinea pig.	Platelets 254,250; brom- sulfalein dye retention 0.3%; prothrombin time normal.

shoulder, neck of the left radius, hip joints, distal interphalangeal joint of the right index finger and head of the left second metatarsal, as well as calcification of the thyroid gland, and osteoporosis of spine and pelvis were visualized roentgenographically.

The working diagnosis was hyperparathyroidism with pyelonephritis and renal insufficiency.

On February 23, 1953, surgical exploration of the neck failed to reveal parathyroid disease. Subtotal thyroidectomy, right inferior parathyroidectomy and removal of four cervical lymph nodes were carried out. The parathyroid gland, which measured 6x4x4 mm., was removed in the knowledge that adenomas may occur without appreciable increase in size of the gland and that hyperparathyroidism secondary to renal insufficiency might reveal hyperplasia. The pathologist reported fetal adenoma and calcification of the thyroid gland, normal parathyroid gland (Figure 1), and sarcoid reaction with asteroid bodies in lymph nodes.

Although the latter may be considered as a local reaction to chronic thyroid disease,⁵ the hyperglobulinemia, hypercalcemia, renal calculi and metastatic calcification were best explained on the basis of sarcoidosis. Hypercalcemia was considered to be of pathogenic significance in the renal disease in this case.

For 18 months after operation, the patient did fairly well on a high fluid and low calcium and phosphorus diet. Weakness and pruritus were only

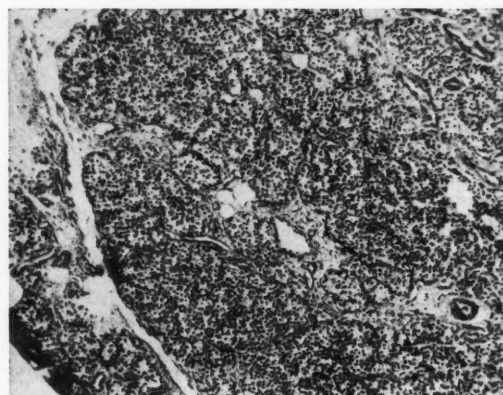


Figure 1.—Parathyroid gland removed at operation, February, 1953, reveals normal structure (X125).

slightly bothersome and she resumed living alone and managing her affairs. The blood pressure fluctuated between 140/90 and 180/110 mm. of mercury. Fine moist rales and the harsh, loud systolic heart murmur persisted.

In June, 1954, massive hematemesis and melena occurred. The patient collapsed and could not summon medical aid for eight hours. Upon admittance to hospital the hemoglobin content of the blood was 3.8 gm. per 100 cc., the hematocrit 13 per cent. Erythrocytes numbered 1.3 million per cu. mm. The

patient received 3,500 cc. of blood. No abnormality was observed in a roentgenogram of the upper gastrointestinal tract.

In July, dependent edema and coarse moist rales developed. Administration of digitalis and mercurial compounds and restriction of sodium intake brought about no change. Pulmonary congestion, as well as cardiac enlargement, was evident on a roentgenogram of the chest. The patient died with severe anasarca in September, 1954.

At autopsy nephrocalcinosis, nephrolithiasis, arteriolar nephrosclerosis, chronic pyelonephritis, chronic rheumatic heart disease with aortic stenosis and cardiomegaly and sarcoidosis of lymph nodes and lungs were noted. Metastatic calcification was also apparent in lymph nodes and connective tissue of the neck. Careful search in the neck and thorax failed to reveal a parathyroid adenoma. Giant cells of the sarcoid lesions contained both asteroid and Schaumann bodies (Figure 2).

DISCUSSION

Renal insufficiency in the present case was considered a result of arteriolar nephrosclerosis and hypercalcemia. Sarcoidosis has been reported to bring about renal insufficiency in four ways: (1) by glomerulonephritis with hyalinosis as in other hyperglobulinemias;¹⁵ (2) by displacement of renal parenchyma by invasive granulomas;² (3) by granulomatous periarteritis;^{11,14} and (4) by hypercalcemia with nephrocalcinosis and calculi.^{4,6,8,13} In the present case, evidence of the first three phenomena was absent.

Renal insufficiency secondary to sarcoidosis, hyperparathyroidism and hypervitaminosis D is attributed to hypercalcemia. Clinical characteristics of such renal insufficiency are reported to differ from those of the usual type of chronic nephritis, for hypertension, cardiac enlargement, retinopathic change, peripheral edema and anemia are usually absent.^{8,9} The patient in the present case had hypertension, anemia, cardiac enlargement and terminal edema, which may be at least partly explained on the basis of aortic stenosis. Arteriolar nephrosclerosis and hypercalcemia probably both contributed to the patient's severe renal insufficiency. Uremia seems the most likely cause of the gastrointestinal hemorrhage with which terminal illness began.

Hyperphosphatemia has been recently reported in five patients with sarcoidosis.^{3,10,13} three of whom had azotemia. Autopsy in three of those cases, and in the present case as well, confirmed renal lithiatic disease with metastatic calcifications. Hyperglobulinemia and hyperphosphatemia should help differentiate sarcoidosis with renal insufficiency from hyperparathyroidism.³ Elevated serum globulin and negative history aid in excluding hypervitaminosis D.

Recent evidence suggests that the hypercalcemia of sarcoidosis is due to excessive endogenous production of vitamin D-like substances, which increase the absorption of calcium from the gastrointestinal tract.⁷

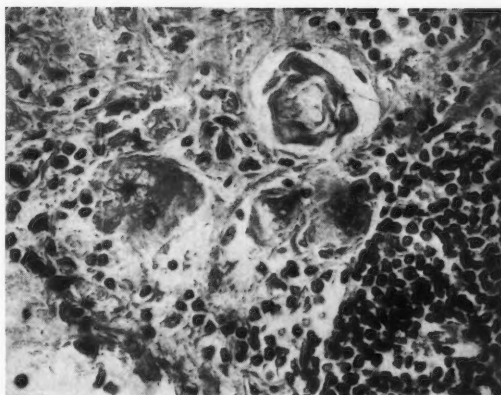


Figure 2.—Lymph node revealing sarcoid lesion with Schaumann body and giant cell containing asteroid ($\times 500$).

SUMMARY

A 72-year-old white woman with symptoms of uremia and hypertension also had hyperglobulinemia, hypercalcemia, hyperphosphatemia, metastatic calcification, nephrolithiasis and aortic stenosis. Surgical exploration of the neck failed to reveal parathyroid gland disease.

Autopsy 18 months later revealed sarcoidosis of lymph nodes and lungs, pyelonephritis, arteriolar nephrosclerosis, nephrocalcinosis, nephrolithiasis and chronic rheumatic heart disease with aortic stenosis.

The evidence suggested that hypercalcemia of sarcoidosis and arteriolar nephrosclerosis were jointly responsible for the patient's advanced renal insufficiency.

Hyperglobulinemia and hyperphosphatemia are the two most valuable, though not infallible, laboratory findings to differentiate sarcoidosis from primary hyperparathyroidism.

So far as could be determined this is the seventh reported case of hypercalcemic renal insufficiency with sarcoidosis in which primary hyperparathyroidism was suspected but not found at surgical or postmortem examinations.

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Tissue Destruction and Death from Microwave Radiation (Radar)

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THE TERM *microwave* is popularly used to designate a certain range of waves in the radio frequency spectrum, including frequencies from approximately 1,000 mc. (megacycles) per second to 30,000 mc. per second or higher. Expressed in wavelength, this spectrum is from 30 cm. to 1 cm. or less. Microwaves are usually produced by means of specially constructed tubes such as the magnetron and klystron. *Radar* is a term coined for military apparatus using microwaves of this kind.

Previously reported work has emphasized the potential hazards of absorption of microwaves by body tissues. It has been reported that totally absorbed energy of 100 to 1,000 watts will cause intolerable temperature values.⁷ The relationship of absorbed energy and energy flux is dependent upon the reflective coefficient of the surface of the human body.⁸ There are many variables such as the radiant frequency, the amount of skin, the amount of subcutaneous fat and the temperature of such tissues. Investigation has not proceeded to the point at which it is possible to state tolerance levels in terms of radiant power, but currently 0.01 watt per square centimeter is the recommended tolerance level.

Penetration is to some extent a function of frequency, and one of the advantages of microwave diathermy is that deeper tissues can be heated more efficiently. Likewise, wavelengths of 30 to 50 cm. will give greater depth of penetration with more efficiency than 12 cm. radiation.

Cellular injury or death occurs when tissue temperature is maintained at 5°C. above the normal blood temperature. Tissue temperature even a few degrees above normal body temperature is dangerous. Irreversibility depends upon the duration of the hyperthermic episode. The higher the temperature, the shorter the time necessary to cause cell death. Tissues respond to heat denaturation with an aseptic

inflammatory reaction and subsequently are prone to infection. Local temperatures of 64°C. will cause tissue necrosis and gangrene at the site. Such temperature elevations have been brought about in the hollow intestinal organs of animals and in an excised eye with 12.5 cm. microwave radiation at a power of 100 watts.

Not all areas of the body are equally well equipped with mechanisms for regulating their temperature by means of a change in flow of blood. The chambers of the eye and the contents of the hollow viscera, such as the gallbladder, urinary bladder and lumen of the gastrointestinal tract are relatively avascular and largely devoid of effective mechanisms for regulation of temperature. Temperature increase in living tissues and organisms during exposure to high frequency electromagnetic waves depends upon at least four factors: (1) Specific areas exposed and the efficiency of the heat eliminating mechanism; (2) intensity of radiation; (3) duration of the exposure; (4) specific frequency of the radiation. Hines and Randall⁴ made a study of changes in temperature in various areas of rabbits during irradiation with electromagnetic waves (Table 1). It was noted, that whereas the visceral temperatures were elevated, the oral and rectal temperatures remained within normal limits. The elevation was particularly pronounced in the relatively avascular hollow viscera. In these experiments, when only the abdomen was irradiated, it appeared that death was preceded by a syndrome resembling that noted in burns and traumatic shock.

TABLE 1.—Changes in Temperature in Various Areas of Rabbits During Irradiation with Electromagnetic Waves⁴

Region	Times in Minutes					
	1	2	3	10	20	30
	Temperature change in degrees C.					
Ileum	-4.2	....	14.4	29.5	38.5	42.9
Stomach	1.8	3.4	5.4	....	19.2	23.1
Gallbladder	....	0.1	0.3	1.8	4.0	6.3
Urinary bladder	1.3	2.1	3.0	5.6	....	9.7
Rectal	0.1	....	0.1	0.2	....	0.8
Oral	-0.2	....	0.2	-0.5	-0.9	-1.2

Submitted September 13, 1956.

Boyle and co-workers¹ expressed belief that the heat from microwaves is due mainly to the dipolarity of water—that in blood 80 per cent of the heat is the result of dipolar effect and 20 per cent of ionic conductance. In the penetration of water the energy delivered at a depth of 2.5 cm. was 10 per cent of the emitted energy. The penetration was better in living tissue because of its homogeneity. The temperature rise was greater in hollow viscera ordinarily having a liquid content than it was in other hollow viscera.

Imig and Hines⁵ noted that in testicular degeneration due to heat, the greatest damage was to the mucosa and extended outward from the mucosal surface.

Oldendorf⁶ used 12.5 cm. microwave radiation to destroy brain tissue selectively in rabbits without apparent evidence of a burn on the skin.

The following is a report of a case in which the patient died from tissue destruction caused by absorption of microwave energy.

CASE REPORT

A 42-year-old white man, while working, stood directly in the beam of a radar transmitter, within ten feet of the antenna. In a few seconds he had a sensation of heat in the abdomen. The heat became intolerable in less than a minute and he moved away from the antenna. Within 30 minutes he had acute abdominal pain and vomited. When medically examined, an hour after the exposure, he was in a state of mild shock. The blood pressure was 90/30 mm. of mercury and the radial pulse rate 72 with auricular fibrillation.

Upon abdominal examination generalized acute tenderness was noted, with decided muscle spasm and rebound tenderness. There were no peristaltic sounds. Leukocytes numbered 10,300 per cu. mm.—82 per cent neutrophils, 5 per cent eosinophils, 10 per cent lymphocytes and 3 per cent monocytes.

In an x-ray film of the abdomen, there was no evidence of free air under the diaphragm. A specimen of urine was unobtainable.

The patient denied any history of symptoms suggestive of gastric disease. He had had rheumatic endocarditis in childhood and had had a mitral commissurotomy one year previously. Since the cardiac operation the patient had been taking digitalis. Whether he had had fibrillating before the present episode was not known.

The patient was immediately admitted to hospital. Additional x-ray films did not show free air in the peritoneal cavity. The stomach was greatly distended and there was a small amount of gas in the colon, pooled in the cecum and ascending colon. The general appearance of the abdomen was considered consistent with acute peritonitis. X-ray films of the chest showed considerable cardiac enlargement with elevation of the left diaphragm.

Leukocytes numbered 15,700 per cu. mm.—90 per cent segmented forms, 5 per cent stab cells and

5 per cent lymphocytes. The urine showed traces of bile. Serum amylase was 170 units on one occasion (normal, less than 180) and 161 units on another. The direct serum bilirubin was 0.02 mg. per 100 cc. (normal 0.02 or less) and the total was 1.2 mg. per 100 cc. (normal less than 1 mg.).

Diagnostic possibilities considered were mesenteric embolus or thrombosis, or a perforated peptic ulcer. The patient was prepared with fluids and other supportive measures, and operation was done six hours after the onset of pain.

The peritoneum contained approximately 500 cc. of serosanguinous fluid, which proved to be sterile. The entire parietal and visceral peritoneum were dusky red and the portion of the small bowel that could be seen was beefy in color. All visible surfaces were covered with petechiae approximately 1 mm. in diameter. The appendix appeared gangrenous. It was removed. The patient did reasonably well after operation. The abdomen was continually decompressed and on the fourth day after operation, peristaltic action apparently having begun, fluids were given by mouth. On the fifth postoperative day, diarrhea and abdominal distention occurred. Chloramphenicol was substituted for the previously prescribed tetracycline but diarrhea persisted. Tests of stool specimens taken the fifth day and sixth postoperative day were negative for occult blood and *E. coli* grew on culture.

On the sixth postoperative day leukocytes numbered 17,000 per cu. mm. of blood—85 per cent segmented forms, 7 per cent stab cells and 5 per cent lymphocytes. The platelets numbered 156,000 per cu. mm. and it was impossible to get clot formation for clot retraction measurement. The serum potassium and chloride values were within normal limits.

Distention continued and a film of the abdomen on the eighth postoperative day showed evidence of bowel obstruction, probably in the right lower quadrant at the level of the terminal ileum. Despite continuous decompression with a Miller-Abbott tube, the condition was unchanged in another x-ray film 24 hours later.

On the tenth postoperative day evisceration of the abdominal wound occurred. The patient was in profound shock. Operation was done immediately. At a point in the jejunum 1.25 meters proximal to the ileocecal valve there was an oval perforation 4 cm. long with smooth edges in the long axis of the bowel. The portion of the bowel at the point of perforation lay in the left side of the abdomen at the level of the umbilicus. A six inch segment of bowel was resected and the abdomen was closed. The patient continued in shock and died in 24 hours.

Pathologist's Report on Surgical Specimens

The appendix was intact, 8 x 1.3 cm., with proximal stenosis. Distally the lumen was filled with pus and the surface was covered with pus. A culture of material taken from the surface at operation was sterile. Dense polymorphonuclear infiltration was

observed throughout the wall, which had been thinned by expansile pressure.

Multiple sections of the small intestine showed plastic peritonitis. Fibroblastic and capillary proliferation formed a moderately thick tissue on the surface, with a moderate mixture of polymorphonuclear leukocytes and a large component of small round cells. Mild inflammatory cell infiltrate was present throughout the muscularis, and in the submucosa there was severe edema with a scattering of inflammatory cells of a type similar to those in the peritoneal exudate. However, there was a greater prominence of plasma cells in this location. Pronounced enteritis was present, with an increase of plasma cells and small round cells between the orderly straight glands of the mucosa. The vessels contained no thrombi, and there was no evidence of vasculitis. In sections taken from the area of perforation a plastic reaction was noted around the edges with a fairly large component of polymorphonuclear leukocytes. It was not essentially different from the reaction elsewhere in the small intestine. No amebae and no areas of focal necrosis or tubercles or other specific inflammatory lesion were seen.

Pathologist's Report on Autopsy

At postmortem examination the abdominal organs were covered with a purulent exudate and the abdomen contained a moderate amount of turbid, yellow fluid.

A culture of a specimen of stool grew *E. coli*.

There was an extensive old, partly organized mural thrombus of the left atrium extending into the auricle.

The liver, which weighed 1,500 grams, showed fine nodular darkening but no passive congestion.

The spleen was twice normal size, weighing 300 gm. It contained two large pyramidal hemorrhagic infarcts of recent origin. The capsule was not thickened and there were no thrombi in the hilar vessels.

The stomach and duodenum were normal. The small intestine was dilated and the mucosa was edematous. 1.25 meters proximal to the cecum there was an intact side-to-side anastomosis with a 4 cm. lumen. Edema was noted throughout the small bowel. In the distal jejunum and ileum there was pronounced follicular hyperplasia of submucosal aggregates with prominent redness and central white spots. These lesions, which were 2 to 3 mm. in diameter, were present in every square cm. of the submucosa. There was no associated ulceration. The site of appendectomy was intact. Scattered patches of induration and exudate were noted on the mesentery and mesocolon. Upon dissection of the mesentery no thrombosis was observed. The adrenal glands were remarkably small, the combined weight being 3 gm. The cortices were thin and regular, the medulla autolysed.

Sections of the small intestine obtained at autopsy were examined microscopically and an inflammatory reaction identical to that previously noted in the surgical specimen—plastic peritonitic exudate and

diffuse inflammation and edema throughout the wall, with prominent small round cell infiltrate of the mucosa. On the periphery was a thin crust of fibrin and cellular debris. The reddish spots observed in the gross specimen corresponded to areas of inflammatory cell infiltrate, mostly lymphocytes, and of telangiectasia. Again there was no evidence of amebiasis or tuberculosis or other specific inflammatory patterns.

In the ileum, the follicular hyperplasia was non-specific and necrosis was not present. Sections of the colon showed a peritonitic exudate, but no noteworthy intrinsic inflammation.

In the spleen, hemorrhage in the pulp was noted in the areas of infarction. Otherwise it was normal. The lungs, liver, pancreas, adrenals, kidneys and brain were normal microscopically.

Diagnosis

- I. Enteritis, type undetermined
 - A. Recent ulceration and perforation of the jejunum
 1. Recent resection of perforated segment (and) appendectomy
 2. Subacute suppurative peritonitis.
- II. Adrenal gland atrophy (3 gm.)
- III. Rheumatic heart disease
 - A. Mitral stenosis
 1. Mural thrombus in left atrium
 2. Old healed commissurotomy.

In this very perplexing case multiple sections were made of the small intestine particularly, in order to evaluate the sequence of events and the direction of spread of the inflammatory process. The most critical problem was whether or not the enteritis, which involved the entire wall of the intestine, was simply a neighborhood reaction from peritonitis. If that were the case, the perforation of the small intestine was unexplained. However, the very definite and diffuse mucosal inflammation of a small round cell type and the lack of dense continuity with the plastic peritoneal exudate strongly suggested that peritonitis was secondary to enteritis. There was definite hypoplasia or atrophy of the adrenal glands, but whether that was related to the cause of death was not apparent.

Pseudomembranous enterocolitis was precluded by the absence of blood and tissue in the stool, by the presence of *E. coli* and by the postmortem appearance of the colon.

The frequency and power factors of the microwave radiation to which the patient was exposed were unavailable because of security regulations. It was enough to cause a painful sensation of heat in the abdomen, however, and when heat can be felt, the tolerable level has been exceeded.⁸ Although the power factor is not known it is known that the armed forces are using equipment emitting 2.5 megawatts peak power.⁷

It seems probable that the fluid contained in the small bowel received at least 10 per cent of the energy flux and that the temperature immediately was elevated high enough to denaturize the protein of the mucosal lining and initiate a severe enteritis. The whole reaction was one of inflammation, rather than infection.

The pathological findings are comparable to those brought about by Boysen² in experimental animals. Using radiation equipment emitting 5 to 500 watt power, he achieved pathological changes with whole body radiation. The jejunum and ileum were especially susceptible, showing hyperemia, hemorrhage and necrosis. Hyperemia of the spleen and hemorrhage into the myocardium were observed. Bloodless diarrhea ensued in each instance.

In the case here reported, the sudden onset, with sensation of unbearable heat, the cooked, hemorrhagic appearance of the small bowel and the pathological reports all point to the local absorption of heat in the umbilical and hypogastric regions with some generalized whole body radiation effect appearing in the myocardium, liver and spleen.

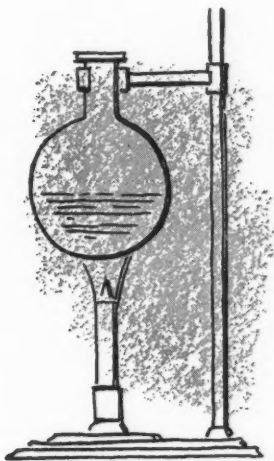
The hemorrhagic infarcts of the spleen were similar to those seen by the author in two other patients

who were exposed to sufficient microwave radiation to cause pathological changes in the tissues.

1252 South Central Avenue, Glendale 4.

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California MEDICINE

For information on preparation of manuscript, see advertising page 2

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EDITORIAL

Men, Machines and Medicine

MEN BUILD AUTOMOBILES. Men drive automobiles. And, to the sorrow of all, men often drive automobiles into other automobiles, or into other objects, or off the road or in some other way which causes injury or death.

Last year the nation reported more than 40,000 persons killed and more than 1,350,000 injured, with more than 100,000 of the latter having permanent injuries. Three-fourths of these casualties were occupants of passenger cars.

Such statistics in the field of clinical medicine would immediately call for extensive research to discover the cause of disease and its cure. Health officers and practicing physicians would team up to search for ways to wipe out any illness which resulted in morbidity and mortality figures of this magnitude.

Today that sort of teamwork is a reality in the matter of automobile crash injuries. The medical profession is working with engineers, police officers, hospitals, statisticians and others in an effort to determine the cause of automobile injuries and to work for the elimination or decrease of the number and severity of these casualties.

An aim of the current study, which is being carried on by the Department of Public Health and Preventive Medicine of the Cornell University School of Medicine, is to determine the frequency and severity of injuries to various areas of the body. Coupled with this is a search for methods of designing automobiles in such a way as to eliminate or minimize both the frequency and severity of the injuries.

Earlier phases of research into automobile crashes have hinged mainly on engineering and educational studies. Highway engineers have learned to separate opposing lanes of traffic, to make crossings safer and otherwise design highways so that certain types

of accidents may not occur. However, even with the latest type of superhighway, accidents are not eliminated so long as human nature remains what it is and carelessness, inexperience, emotional instability, drunkenness and fatigue still are factors.

Under these circumstances, safety engineers have decided that there will continue to be accidents. If so, it is good sense to try to minimize their effects.

Out of the Cornell University and other studies have come some concrete ideas for automobile design. The depressed hub of steering wheels, seat belts, safety door catches and padded instrument panels are coming more and more into prominence, all the results of this type of study.

Research has shown that 71 per cent of all auto crash injuries are to the head. Studies into the human tolerance to force have shown that common structures such as airplane instrument panels, when constructed of light metal which would deform under impact, absorbing much of the energy, could be struck by the head at impact velocities of 40 to 50 miles per hour without causing skull fracture, loss of consciousness or subsequent evidences of concussion. Such knowledge is bound to be translated into automobile construction.

Data gathered on cars with safety catches on the doors, padding, seat belts, etc., show that occupants of cars with these have a reduction of 29 per cent in the risk of injury rated dangerous. As to improved door-locking mechanisms alone, statistics show that there is a reduction of 27 per cent in the chance of front doors opening on impact and a reduction of 50 per cent in the chances of passenger ejection. Present findings are that seat belts, properly designed and installed, can reduce injury rates by as much as 30 to 60 per cent, depending on the type of accident and other factors.

The medical profession's part in this study boils down to a careful report on injuries received in

automobile accidents. The Cornell University studies being carried out in California correlate standardized data from the attending physician with the California Highway Patrol, the hospital emergency room and the State Department of Public Health.

When an automobile accident occurs and there are injuries, the highway patrolman on the case fills in a few basic items on a report sheet. These relate briefly the type of accident and the position of the occupants in the car at the time of the crash. His report is then delivered to the attending physician or the hospital emergency room. The physician reports, on front-and-back charts of the human body, the location, type and severity of the injuries. This report is then forwarded to the State Department of Public Health, which correlates it with reports and photographs forwarded by highway patrol investigators. The completed report then goes to Cornell, where it is analyzed.

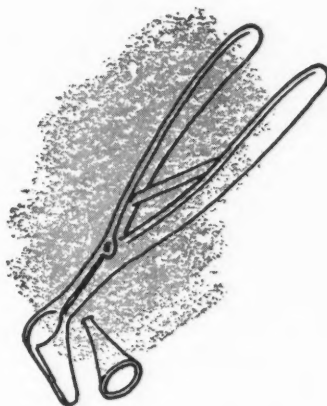
To date only San Luis Obispo County has served as a California reporting area for these studies. New areas are now being opened up, including the counties of San Mateo, San Benito, Stanislaus, Tuolumne and Calaveras. These areas will furnish their experience of six months, after which another six-month

report will be sought in San Joaquin, San Bernardino and part of Riverside County.

In all, three years will be devoted to the gathering of statistics in California. The studies will cover metropolitan, suburban and rural areas, all types of highways, all types of terrain and all types of weather conditions.

In making these studies, Cornell University is working under the sponsorship of the Armed Forces Epidemiological Board through its Commission on Accidental Trauma. Funds for the studies come from the Surgeon General of the Army, the United States Public Health Service, Ford Motor Company and the Chrysler Corporation. The automobile makers have provided their funds on an unrestricted basis.

The California Medical Association has been proud to lend its assistance to these studies, which have already produced worthwhile results. Members of the Association in the counties being studied have responded admirably to the request for medical knowledge and reporting in accident cases. Such cooperation may be expected to continue. The end result of this research, if interim findings may be taken as a criterion, will be an immense saving in human life and human suffering.



California MEDICAL ASSOCIATION

NOTICES & REPORTS

Council Meeting Minutes

Tentative Draft: Minutes of the 423rd Meeting of the Council, San Francisco, Mark Hopkins Hotel, March 3, 1957.

The meeting was called to order by Chairman Lum at 8:00 a.m., Sunday, March 3, 1957, in the Bonanza Room of the Mark Hopkins Hotel, San Francisco.

Roll Call:

Present were President Charnock, President-Elect MacDonald, Speaker Doyle, Vice-Speaker O'Neill, Secretary Daniels, Editor Wilbur and Councilors West, Wadsworth, Pearman, Harrington, McPharlin, Sherman, Lum, Bostick, Teall, Kirchner, Reynolds, Varden, Carey, Heron and Rosenow.

Absent for cause, Councilors Wheeler and Loos. A quorum present and acting.

Present by invitation during all or a part of the meeting were Messrs. Hunton, Thomas, Clancy and Gillette of C.M.A. staff; Messrs. Read and Salisbury of the Public Health League of California; county society executive secretaries or assistants Scheuber of Alameda-Contra Costa, Jensen of Fresno, Pettis of Los Angeles, Bannister of Orange, Foster of Sacramento, Donmyer of San Bernardino, Nute of San Diego, Neick of San Francisco, Thompson and Pearce of San Joaquin, Wood of San Mateo, and DeVere of Stanislaus; Doctor Jay Ward Smith, Associate Dean of Stanford Medical School; Doctor Walter E. Macpherson, Dean of College of Medical Evangelists, Doctor John B. deC. M. Saunders, Dean, and Doctor Malcolm Watts, Assistant Dean, of University of California School of Medicine; Doctors A. E. Larsen and William Gardenier and Messrs. K. L. Hamman, Etchel Paolini, Wilson Wahlberg and Richard Lyon of California Physicians' Service; Doctor John Adams of UCLA Medical School; Fred O. Field, legal counsel to the Los Angeles County Medical Association; Mr. Rollen

Waterson, consultant; Richard Blum, Ph.D., consultant; Floyd Heffron, executive secretary of the State Board of Pharmacy; Doctor Malcolm H. Merrill, state Director of Public Health; Doctor Walter E. Batchelder, medical director of the Cancer Commission; and Doctors Jay J. Crane, J. Lafe Ludwig, T. J. Rossitto, William F. Quinn, Joseph F. Sadusk, Jr., Francis J. Cox, John W. Cline, L. Henry Garland and Howard Naffziger.

1. Minutes for Approval:

(a) On motion duly made and seconded, minutes of the 422nd meeting of the Council, held November 10, 1956, were approved.

(b) On motion duly made and seconded, minutes of the 261st meeting of the Executive Committee, held December 6, 1956, were approved.

(c) On motion duly made and seconded, minutes of the 262nd meeting of the Executive Committee, held January 31, 1957, were approved.

2. Membership:

(a) A report of membership as of March 14, 1957, was presented and ordered filed. (Action taken March 17.)

(b) On motion duly made and seconded in each instance, 14 applicants were voted Associate Mem-

DONALD A. CHARNOCK, M.D.	President
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JAMES C. DOYLE, M.D.	Speaker
J. NORMAN O'NEILL, M.D.	Vice-Speaker
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Southern California Office:	
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bership. These were: Iwao Kawakami, Morris L. Steckel, Los Angeles County; H. M. F. Behneman, Lucille M. Fostvedt, Joseph J. McMullin, Riverside County; Paul L. Kingsley, Marcia J. Levin, Morton R. Steinberg, San Francisco County; Robert M. Halbach, San Joaquin County; Dean R. Archer, Raymond Leer, Emmett Litteral, Oliver Byrd, Gerald K. Ridge, Santa Clara County.

(c) On motion duly made and seconded in each instance, 5 applicants were voted Retired Membership. These were: Jay H. McClellan, Joseph L. Szekeley, Los Angeles County; Wm. Edwards, Sr., Marin County; J. M. McColl, San Diego County; Daniel M. Clark, Ventura County.

(d) On motion duly made and seconded, 25 members were granted reductions in dues because of prolonged illness or postgraduate study.

3. Financial:

(a) A report of bank balances as of March 14, 1957, was presented and ordered filed. (Action taken March 17.)

(b) A request for expenses incurred in 1954 was reviewed and, on motion duly made and seconded, ordered paid.

(c) A request for a loan to repair damages suffered in the 1955 floods was ordered referred to the Executive Committee.

(d) A proposed budget for the 1957-1958 fiscal year was presented by the Auditing Committee and, on motion duly made and seconded, was tentatively approved for submission to the House of Delegates, with certain items to be reconsidered.

4. Committee on Legislation:

(a) Doctor Dan O. Kilroy, chairman of the Committee on Legislation, and Howard Hassard, legal counsel, discussed a number of legislative proposals which have been introduced into the current State Legislature. After discussion of the various items, the Council instructed the committee as to its attitudes on the several measures.

(b) Doctor J. Lafe Ludwig, member of the Committee on Legislation of the American Medical Association, gave a report on several items now before the federal Congress and suggested that the Council, give some thought to means by which an increased interest in federal legislation might be achieved.

(c) Mr. Floyd Heffron, Executive Secretary of the California State Board of Pharmacy, discussed several legislative proposals before the State Legislature from that board. These measures are mainly designed to provide closer control over the dispensing of dangerous or hypnotic drugs.

(d) Doctor John W. Cline discussed a state legislative proposal to provide for adequate scientific

testing of drugs or methods used in cancer therapy and for the legal restriction of items found without merit. On motion duly made and seconded, it was voted that the Association should cosponsor this proposal, along with other organizations.

On motion duly made and seconded, it was voted that the Legislative Committee should manage the progress of this measure in the State Legislature.

5. Crippled Children's Services:

Doctor L. Henry Garland and Doctor John Adams reported that current regulations in the Children's Bureau of the California State Department of Health prohibited the payment of fees to radiologists for performing angiocardiograms as diagnostic procedures prior to surgery, although such fees might be paid to hospitals under a formula adopted for the payment of hospital costs. They urged the Council to consider the advisability of the Association's requesting the State Department of Health to revise this procedure so that radiologists might receive fees direct for such services. On motion duly made and seconded, it was voted to advise the State Department of Health that it is the belief of the Council that physicians who perform authorized services under the Crippled Children's program are entitled to bill and collect fees for such services in their own names. This would include hospital radiologists who customarily render their own bills to the patient.

6. Rehabilitation:

Doctor Francis J. Cox reported that the governor plans to hold a Governor's Conference on Rehabilitation of the Physically Handicapped in the fall of 1957 and that, due to state legal restrictions, it might be necessary for some other organization to serve as fiscal or management agency for such conference. He suggested the possibility of the Association's offering to serve in this capacity if discussions of the steering committee (of which he is a member) of this conference should indicate the advisability of doing so. On motion duly made and seconded, it was voted to approve this suggestion.

Doctor Cox also stated that meetings would be planned with the chairman of medical services committees of the county societies for discussion of the rehabilitation and other programs under governmental auspices. On motion duly made and seconded, such meetings were approved.

As a means of continuing the interest in the rehabilitation and allied fields, Doctor Cox suggested the possible advisability of retaining a professional representative.

7. Public Relations:

On motion duly made and seconded, it was voted to advise a county medical society that the material forwarded to all county societies relative to pro-

posed poliomyelitis vaccination programs was considered to be of an informative, not a policymaking nature and had been sanctioned by the Council.

8. *Committee on Medical Education:*

On motion duly made and seconded, Doctor Edward C. Rosenow, Jr., Chairman of the Commission on Medical Education, was authorized to reactivate a subcommittee on physical function which had been in existence several years earlier, subject to the submission of detailed plans of the subcommittee which might require the expenditure of funds.

Recess:

At this point, 5:30 p.m., the Council was declared in recess, to reassemble in Los Angeles at 9:30 a.m., Sunday, March 17, 1957.

Reconvention:

The meeting was reconvened on Sunday, March 17, 1957, at 9:30 a.m. in the Colonial Room, Ambassador Hotel, Los Angeles.

On roll call, all councilors and officers noted present on March 3 were again present except Editor Wilbur and Councilor Kirchner; Councilors Wheeler and Loos, not present March 3, were present March 17.

In addition, Doctors Wayne Pollock, John E. Vaughan and C. V. Thompson and Messrs. Edgar Colvin and Ray Grove were present.

9. *Committee on Other Professions:*

Doctor Wayne Pollock, chairman of the Committee on Other Professions, presented a progress report on the negotiations of his committee with a similar group from another profession.

10. *Medical Review and Advisory Board:*

(a) Doctor Joseph F. Sadusk, Jr., chairman of the Medical Review and Advisory Board, gave a progress report on the activities of the board. He called attention to the advertising of certain insurance carriers and, on motion duly made and seconded, it was voted that the Advertising Committee be requested to meet with the board for consideration of what type of advertising would be considered acceptable.

(b) Consideration was given to a proposed press release detailing some of the findings of the board in its research activities and, on motion duly made and seconded, it was voted to approve the press release submitted and previously approved by the Committee on Public Relations.

11. *Central California Blood Bank:*

Mr. Roy Jensen, administrator of the Central California Blood Bank and executive secretary of the Fresno County Medical Society, reported that Central California Blood Bank had absorbed the service formerly provided by another blood bank

in the area and was now operating on a self-sustaining basis and serving 35 hospitals.

12. *Appointment of Nominating Committees:*

(a) The chairman proposed, and the Council confirmed, the appointment of Doctors Bostick (chairman), Doyle and Varden as a committee to bring in nominations for the Board of Trustees of California Physicians' Service.

(b) The chairman proposed, and the Council confirmed, the appointment of Doctors Rosenow (chairman), Sherman, MacDonald and West to bring in nominations for appointment of members and chairmen of commissions and committees.

13. *Woman's Auxiliary:*

The chairman proposed, and the Council confirmed, the appointment of Doctors John W. Cline and R. Stanley Kneeshaw as members of the Advisory Board to the Woman's Auxiliary to the C.M.A. for the 1957-1958 year.

14. *California Physicians' Service:*

Councilor T. Eric Reynolds, president of California Physicians' Service, reported that the Board of Trustees of C.P.S. believed that organizational changes should be made which would permit the selection of a president as a full-time officer and the naming of one member of the Board of Trustees as chairman of that board for annual periods, with tenure limited to two successive years. On motion duly made and seconded, it was voted to approve these recommendations.

15. *Commission on Medical Services:*

(a) Doctor Francis J. Cox reported on a meeting held March 16 for the discussion of pending changes in social security laws and allied subjects. He proposed that a similar meeting be planned in a northern city prior to the 1957 Annual Session and, on motion duly made and seconded, approval was voted for such a meeting.

(b) Several changes in fees applicable to the "Medicare" program were presented and approved by the Council.

(c) A listing of fees for anesthesiology, arranged on a procedure or global basis, rather than a time basis, was presented as a proposed change in the Relative Value Schedule and, on motion duly made and seconded, the theory of such fees and the fees themselves were voted approval.

(d) Doctor Cox made progress reports on the application for proposed changes in industrial medical fees and on the Governor's Conference on Rehabilitation of the Handicapped.

16. *Resolutions of 1956 House of Delegates:*

The Council reviewed three items referred to it by the 1956 House of Delegates, as follows:

(1) Resolution No. 23, relative to narcotic drugs: On motion duly made and seconded, it was voted that no action be taken at this time because of the controversial nature of the subject.

(2) Resolution No. 24, relative to the definition of a specialist: On motion duly made and seconded, it was voted to request the appropriate Council of the American Medical Association for clarification of the definition of specialists.

(3) Resolution No. 36, relative to the labeling of all prescriptions: On motion duly made and seconded, it was voted to disapprove the proposal that all prescriptions be labeled for the reason that it was felt the prescribing physician should have free choice as to whether or not he desired such labeling.

17. *County Society Charter:*

At the request of the Shasta County Medical Society, it was regularly moved, seconded and voted to request the House of Delegates to issue a new charter in the name of Shasta-Trinity County Medical Society.

18. *Committee on School Health:*

Doctor Albert C. Daniels, chairman of the Committee on School Health, reported on decisions reached by that committee and requested Council approval.

(a) On motion duly made and seconded, it was voted to increase the size of the committee from seven to nine members.

(b) It was agreed that the committee should continue its biennial statewide meetings and emphasize county meetings, discontinuing regional meetings.

(c) On motion duly made and seconded, it was voted to approve local school health meetings arranged by local health departments and school superintendents.

(d) On motion duly made and seconded, it was voted to urge the State Department of Education to encourage surveys of school health programs where such surveys were desired.

(e) On motion duly made and seconded, it was voted to recommend to the State Department of Education that serious consideration be given to including preparation in the area of school health for all candidates for revised administrative credentials and for all candidates for elementary and secondary teaching credentials.

19. *Commission on Public Health and Public Agencies:*

On motion duly made and seconded, it was voted to add Doctor Donald C. Harrington to the membership of the Commission on Public Health and Public Agencies in his capacity as chairman of the Committee on Maternal and Child Care.

20. *Public Assistance:*

Mr. Hassard and Doctors Carey and Reynolds discussed the need of establishing a policy to be followed in the assignment of medical benefits to the aged, the blind and the needy children under terms of Public Law 880 of the Congress and a comparable appropriation act now under consideration by the State Legislature. On motion duly made and seconded, it was voted that such policy should call for (1) emphasis on home and office visits, (2) a fee schedule to be established and (3) California Physicians' Service to serve as fiscal agent on a cost-plus basis.

It was agreed to request Mr. K. L. Hamman to serve as the Association's representative at a series of meetings scheduled for discussion of this topic by state authorities.

21. *Legislation:*

On motion duly made and seconded, it was voted to agree to the appointment of a psychology committee under the State Board of Medical Examiners, for the purpose of approving schools, giving examinations and such other matters as the Legislative Committee shall approve, under terms of a psychology registration proposal now before the State Legislature.

22. *Reconsideration of Anesthesiology Fees:*

On motion duly made and seconded, it was voted to reconsider the action taken earlier in the meeting to approve a new schedule of fees for anesthesiology under the Relative Value Schedule.

Motion was made and seconded to defer action on this table of fees at this time but on vote the motion was lost.

Adjournment:

There being no further business to come before it, the meeting was adjourned at 5:50 p.m.

DONALD D. LUM, M.D., *Chairman*

ALBERT C. DANIELS, M.D., *Secretary*

REGIONAL POSTGRADUATE INSTITUTE

SACRAMENTO VALLEY COUNTIES

Presented by Postgraduate Activities Committee of the California Medical Association, in cooperation with Sacramento Valley County Medical Societies, and College of Medical Evangelists, Harold M. Walton, M.D., Chairman, Section on Graduate and Postgraduate Medicine.

TAHOE TAVERN...JUNE 20-21, 1957...LAKE TAHOE

PROGRAM

Thursday, June 20

9:00-10:00 a.m.—“*Health Construction Consultations*” . . . Plotting a Course for the Autumn Years—Edward J. Stieglitz, M.D., Guest lecturer, Research Associate in Charge Investigations in Gerontology, National Institute of Health, U. S. Public Health Service, Washington, D. C.

10:00-12:00 m.—LECTURES:

“*Lumps in the Thyroid*” . . . Management of the Nodular Thyroid—Earl J. Boehme, M.D., Assistant Clinical Professor of Surgery.

“*Pharmaceutical Fables*” . . . Physician's Evaluation of “Popular” New Drugs—John E. Peterson, M.D., Clinical Professor of Medicine.

OR

CONCURRENT SEMINARS

“*Mister Five By Five*” . . . Fads in Weight Reduction*.

“*The Malignant Middle Years*” . . . Cancer Problems in the Older Patient*.

“*Babies—Special Delivery*” . . . Elective and Selective Induction of Labor*.

You may go to the general lecture session or a seminar of your choice

2:00-4:00 p.m.—LECTURES:

“*The Battle of the Bulge*” . . . Technical Aspects of Hernia Repair—Elton L. Morel, M.D., Assistant Professor of Surgery.

“*Good Labor Relations*” . . . How to Avoid Trouble with the Patient in Labor—E. Edson Nichols, M.D., Associate Professor of Obstetrics and Gynecology.

OR

CONCURRENT SEMINARS

“*The Pied Piper and the Mouseketeers*” . . . Office Problems in Pediatrics*.

“*Antiviralotics*” . . . Virus Diseases and Immunization.

“*The Rise and Fall of the Uterine Empire*” . . . Complications During Prenatal Care*.

You may go to the general lecture session or a seminar of your choice

7:00 p.m.—No-host social hour, dinner and dancing.

Friday, June 21, 1957

9:00 a.m.—“*Predictable Emotional Stresses of Later Years*” . . . “*The Slings and Arrows of Outrageous Fortune*”—Edward J. Stieglitz, M.D.

10:00-12:00 m.—LECTURES:

“*Miniature Medicine*” . . . Management of Premature and Sick Infants—Robert F. Chinnock, M.D., Professor of Pediatrics.

“*The Tie That Binds*” . . . Complications of Biliary Surgery—Elton L. Morel, M.D.

OR

CONCURRENT SEMINARS

“*The Hapless Hormones*” . . . Endocrine and Pseudo-endocrine Problems*.

“*The Red Menace*” . . . Significance of Rectal Bleeding.

“*The Skin Game*” . . . Everyday Dermatology*.

2:00-4:00 p.m.—LECTURES:

“*Out, Damned Spot! . . . or Not?*” . . . Diagnosis and Treatment of Moles—Molleurus Couperus, M.D., Assistant Professor of Dermatology and Syphilology.

“*Rectal Reconnaissance*” . . . Technique and Procedures in Proctological Examinations*—Malcolm R. Hill, M.D., Professor of Proctology, Emeritus.

OR

CONCURRENT SEMINARS

“*Medicine Tomorrow*” . . . Social and Economic Changes in Medicine*.

“*Duct*” Hunting . . . Complications of Biliary Surgery*.

“*After the Ball Is Over*” . . . Postoperative Care*.

You may go to the general lecture session or a seminar of your choice

*Each seminar will be led by three physicians from Sacramento and one faculty member from College of Medical Evangelists.

HOST: Sacramento Society for Medical Improvement. . . **REGIONAL CHAIRMAN:** C. M. Blumenfeld, M.D., 4700 Parkridge Road, Sacramento. . . Special activities for the entire family planned beginning with informal buffet dinner, Wednesday, June 19. **FEE:** \$15.00. For additional information, contact Postgraduate Activities office, California Medical Association, 417 S. Hill St., Los Angeles 13. All California Medical Association members and their families are cordially invited to attend.

In Memoriam

ANDERSON, STANLEY CHARLES. Died in Los Angeles, March 31, 1957, aged 57. Graduate of Rush Medical College, Chicago, Illinois, 1929. Licensed in California in 1929. Doctor Anderson was a member of the Los Angeles County Medical Association.

✱

BLOGNINO, OCTAVE J. Died March 13, 1957, aged 68. Graduate of the Regia Università di Torino. Facoltà Medicina e Chirurgia, Torino, Italy. Licensed in California in 1918. Doctor Bolognino was a member of the San Francisco Medical Society.

✱

BROWN, PHYLLIS W. Died December 6, 1956, aged 28. Graduate of the University of Minnesota Medical School, 1953. Licensed in California in 1954. Doctor Brown was a member of the Orange County Medical Association.

✱

LAZELLE, HORACE C. Died March 19, 1957, aged 86. Graduate of the University College of Medicine, Richmond, Virginia, 1900. Licensed in California in 1919. Doctor Lazelle was a retired member of the San Diego County Medical Society and the California Medical Association, and an associate member of the American Medical Association.

✱

LEET, NORMAN BENJAMIN. Died in Oakland, April 4, 1957, aged 53, of heart disease. Graduate of Stanford University School of Medicine, Stanford-San Francisco, 1930. Licensed in California in 1930. Doctor Leet was a member of the Alameda-Contra Costa Medical Association.

MONTGOMERY, COLONEL HARRY. Died in Los Angeles, March 19, 1957, aged 80. Graduate of the University of Toronto Faculty of Medicine, Toronto, Ontario, Canada, 1902. Licensed in California in 1907. Doctor Montgomery was a member of the Los Angeles County Medical Association, a life member of the California Medical Association, and a member of the American Medical Association.

✱

PAEGL, HOLLIS ARTHUR, JR. Died April 2, 1957, aged 37, of injuries received in an automobile accident. Graduate of Tufts College Medical School, Boston, Massachusetts, 1944. Licensed in California in 1951. Doctor Paegel was a member of the Orange County Medical Association.

✱

SNOW, WILLARD G. Died in Sausalito, March 31, 1957, aged 43. Graduate of Harvard Medical School, Boston, Massachusetts, 1939. Licensed in California in 1948. Doctor Snow was a member of the San Francisco Medical Society.

✱

STEWART, CHARLES WESLEY. Died in Burbank, March 29, 1957, aged 83. Graduate of the Denver College of Medicine, Denver, Colorado, 1908. Licensed in California in 1918. Doctor Stewart was a retired member of the Los Angeles County Medical Association and the California Medical Association and an associate member of the American Medical Association.

✱

WEISKOTTEN, WILLIAM OTTO. Died in La Jolla, March 14, 1957, aged 75. Graduate of the State University of New York College of Medicine, Syracuse, 1905. Licensed in California in 1920. Doctor Weiskotten was a retired member of the San Diego County Medical Society and the California Medical Association and an associate member of the American Medical Association.

NEWS & NOTES

NATIONAL • STATE • COUNTY

COLUSA

Dr. John W. Scott of Colusa was appointed to serve as county physician of Colusa County on a temporary basis until the Board of Supervisors considers and acts upon a proposal calling for the county health officer to "work with the county physician" and setting up an additional medical position, that of associate county physician. Dr. Scott, whose appointment is to serve at least until July 1, replaced Dr. Joseph Tillotson, who died last January.

LOS ANGELES

Dr. Theodore J. Curphey, formerly chief medical examiner of Nassau County, New York, has been appointed **coroner of Los Angeles County** to fill a post created by a charter amendment approved by voters last November which separates the duties of coroner from those of public administrator and provides that the coroner shall be a physician.

* * *

The retirement of two professors and the promotion of ten members of the faculty, effective July 1, was announced recently by the **College of Medical Evangelists**.

Dr. Charles M. Gruber, professor and chairman of the department of pharmacology and experimental therapeutics, and Dr. Otto Kampmeier, professor and chairman of the department of anatomy, are the two who will retire. Their places will be taken by Dr. Mervyn G. Hardinge, now associate professor of pharmacology and experimental therapeutics, and Dr. Harold Shryock, who at present is associate professor of anatomy and at one time was dean of the school of medicine.

Promoted: Assistant professor of stomatology Dr. Gordon K. Adams to associate professor; assistant professor of medicine Dr. Clarence Collier to associate professor of physiology; assistant professor of anatomy Dr. Guy Hunt to associate professor; assistant professor of microbiology Dr. Jack Zwemer to associate professor; assistant clinical professor of medicine Dr. Barton Hardin to assistant professor; instructor in anatomy Dr. Richard M. Ritland to assistant professor; associate professor of medicine Dr. Olov Bloomquist to clinical professor; instructors in surgery Dr. Samuel Fritz and Dr. David Hinshaw to assistant clinical professors.

* * *

The newly formed Southern California chapter of the **Pan-American Medical Association**, an organization whose purpose is to strengthen medical ties between nations of

the Western Hemisphere, held its inaugural dinner last month in Los Angeles. Dr. Tracy J. Putnam, president of the association, said that a similar organization existed in Los Angeles until 1941 but died out during the war.

Dr. Charles Pierre Mathe, San Francisco, a trustee of the association, was the principal speaker at the inaugural gathering.

ORANGE

The **Orange County General Hospital** has received a certificate of accreditation from the Joint Commission on Accreditation of Hospitals. Dr. Lewis F. Ellmore, medical director of the hospital, announced recently.

SAN FRANCISCO

Dr. Dwight L. Wilbur was elected president-elect of the **American College of Physicians** at the meeting of the organization in Boston last month.

GENERAL

At the annual meeting of the **California Society of Anesthesiologists**, which was held in conjunction with the Western Conference of Anesthesiologists last month in Sun Valley, Idaho, Dr. Marshall Skaggs of Sacramento was installed as president and Dr. John Howard, San Diego, was named president-elect. Dr. Ronald Simpson, San Francisco, was elected vice-president and Dr. Francis Guinney, Los Angeles, secretary-treasurer. Dr. Bruce Henderson of Oakland was reelected chairman of the board of governors of the Western Conference.

* * *

The second film in the American Medical Association-American Bar Association series on **Medicine and the Law** titled "The Doctor Defendant," will be available from the A.M.A. Film Library for medical society or association showings, beginning July 1, according to Dr. George F. Lull, secretary and general manager of the A.M.A.

The new film dramatically presents four case reports of situations which caused **legal action against physicians**. In reviewing these cases in which malpractice was alleged, the 30-minute black and white sound film also demonstrates how a professional liability committee functions. It will be premiered at the A.M.A. convention in New York City on June 5. "The Medical Witness," the first of the two films, depicts right and wrong methods of presenting medical testimony by reenacting a personal injury trial.

Societies desiring to show either or both films may write to the Film Library, American Medical Association, 535 North Dearborn Street, Chicago 10, Illinois, or to Dr. John B. Chewning, director of professional relations, The Wm. S. Merrell Company, Cincinnati 15, Ohio.

POSTGRADUATE EDUCATION NOTICES

THIS BULLETIN of the dates of postgraduate education programs and the meetings of various medical organizations in California is supplied by the Committee on Postgraduate Activities of the California Medical Association. In order that they may be listed here, please send communications relating to your future medical or surgical programs to: Mrs. Margaret H. Griffith, Director, Postgraduate Activities, California Medical Association, 417 South Hill Street, Los Angeles 13.

UNIVERSITY OF CALIFORNIA AT LOS ANGELES

Techniques of Hypnosis. Monday, Tuesday and Wednesday morning, June 24, 25 and 26. Fifteen hours. Fee: \$60.00.

Advanced Techniques and Application of Hypnosis. Wednesday afternoon, Thursday and Friday, June 26, 27, 28. Fifteen hours. Fee: \$100.00.

Electrocardiography. Monday through Friday, July 8 to 12. Guest instructor: J. Scott Butterworth, M.D., Associate Professor of Medicine, New York University. Thirty hours. Fee: \$150.00.

Auscultation. Monday through Wednesday, July 15 to 17. Guest instructor: J. Scott Butterworth, M.D., New York University. Eighteen hours. Fee: \$100.00.

Current Concepts in Medicine. Thursday, Friday and Saturday, August 1 to 3. Fifteen hours.†

Postgraduate Medical Seminar Cruise to the Hawaiian Islands leaving August 28, returning September 9. Inclusive fare: \$559.00 up.

Contact: Thomas H. Sternberg, M.D., Assistant Dean for Postgraduate Medical Education, U.C.L.A., Los Angeles 24. BRAdshaw 2-8911, Ext. 202.

UNIVERSITY OF CALIFORNIA, SAN FRANCISCO

Fundamental Principles of Radioactivity and the Diagnostic and Therapeutic Uses of Radioisotopes. Two or three month course limited to one enrollee per month. Tuition: \$250.00 per month.

Medical Ophthalmology and Ophthalmoscopy. Thursday and Friday, May 16 and 17. Fourteen hours. Fee: \$60.00.

Arthritis and Rheumatic Diseases. Thursday and Friday, May 16 and 17. Twelve hours. Fee: \$40.00.

Ear, Nose, Throat, Clinics and Seminars. Friday and Saturday, May 24 and 25. Thirteen hours. Fee: \$40.00.

Pediatrics. June 11 to 14.*

Contact: Seymour M. Farber, M.D., Head, Postgraduate Instruction, Office of Medical Extension, University of California Medical Center, San Francisco 22. MOntrose 4-3600, Ext. 665.

†Fee to be announced.

*Hours and Fees to be announced.

STANFORD UNIVERSITY SCHOOL OF MEDICINE

Morning Clinical Conferences, each Monday, Room 515. **Contact:** D. H. Pischel, M.D., Professor, Division of Ophthalmology, Stanford University School of Medicine, 2398 Sacramento St., San Francisco 15.

UNIVERSITY OF SOUTHERN CALIFORNIA, LOS ANGELES

Home Course in Electrocardiography. Physicians may register at any time and receive all 52 issues. Fifty-two weeks. Fee: \$100.00.

Cardiac Resuscitation. Sponsored by the Los Angeles County Heart Association each Wednesday throughout the year, 4 to 6 p.m. Residents admitted without fee. Tuition for all other physicians: \$30.00. (Each session all-inclusive.)

Contact: Phil R. Manning, M.D., Director, Postgraduate Division, University of Southern California School of Medicine, 2025 Zonal Avenue, Los Angeles 33. CApital 5-1511.

CALIFORNIA MEDICAL ASSOCIATION POSTGRADUATE COURSES

POSTGRADUATE INSTITUTES, 1957

SACRAMENTO VALLEY COUNTIES in cooperation with College of Medical Evangelists, June 19 to 21, 1957, Tahoe Tavern, Lake Tahoe. Chairman: C. M. Blumenfeld, M.D., 4700 Parkridge Road, Sacramento.

Contact: The chairman listed above, or Mrs. Margaret H. Griffith, Director, Postgraduate Activities, California Medical Association, 417 So. Hill Street, Los Angeles 13. MAdison 6-0683.

AUDIO DIGEST FOUNDATION, a nonprofit subsidiary of the C.M.A., now offers (on a subscription basis) a series of hour-long tape recordings designed to keep the physician abreast of current happenings in his particular field. Composed of practice-useful abstracts from 600 leading journals, with short lectures and editorial comments from prominent physicians, Audio Digest offers programs covering general practice, surgery, internal medicine, obstetrics and gynecology, and pediatrics.

Contact: Claron L. Oakley, editor, 1919 Wilshire Blvd., Los Angeles 57.

Medical Dates Bulletin

MAY MEETINGS

CALIFORNIA HEART ASSOCIATION Annual Meeting Lafayette Hotel, San Diego, May 17, 18, and 19. **Contact:** J. Keith Thwaites, executive director, California Heart Association, 1428 Bush Street, San Francisco.

NORTHERN CALIFORNIA CHAPTER, AMERICAN COLLEGE OF SURGEONS Fifteenth Semi-Annual Clinical Conference. Sir Francis Drake Hotel, San Francisco, 9 a.m. to 4 p.m., May 18. Edmond Dana Butler, M.D., secretary-treasurer, 18 Dormidera, Piedmont.

WESTERN BRANCH, AMERICAN PUBLIC HEALTH ASSOCIATION annual meeting, Lafayette Hotel, Long Beach, May 29 and June 1. **Contact:** Mrs. L. Amy Darter, Secretary-Treasurer, State Dept. Public Health, 2151 Berkeley Way, Berkeley.

JUNE MEETINGS

CHILDREN'S HOSPITAL OF THE EAST BAY Pediatric Seminar and Clifford Sweet Lectures, June 7 to 8. Guest lecturer: Sydney S. Gellis, M.D., Boston. *Contact:* James Dennis, M.D., medical director, 5105 Dover St., Oakland 9.

STATE BOARD OF MEDICAL EXAMINERS Oral Examination, San Francisco, June 15.*

IDAHO STATE MEDICAL ASSOCIATION 65th Annual Meeting, Sun Valley, June 16 to 19. *Contact:* Mr. Armand L. Bird, executive secretary, 364 Sonna Bldg., Boise, Idaho.

STATE BOARD OF MEDICAL EXAMINERS Written Examination, San Francisco, June 17 to 20.

WYOMING STATE MEDICAL SOCIETY ROCKY MOUNTAIN MEDICAL CONFERENCE Annual Joint Meeting, Jackson Lake Lodge, Moran, Wyoming, June 16 to 19. *Contact:* H. L. Harvey, M.D., Casper, Wyoming.

SUMMER AND FALL MEETINGS, 1957

COLORADO DIVISION, CANCER SOCIETY ROCKY MOUNTAIN Cancer Conference, 9 a.m., July 10 and 11, Shirley-Savoy Hotel, Denver. *Contact:* John S. Bouslog, M.D., Chairman, 835 Republic Bldg., Denver 2.

STATE BOARD OF MEDICAL EXAMINERS Oral Examination, Los Angeles, August 17.*

STATE BOARD OF MEDICAL EXAMINERS Written Examination, Los Angeles, August 19 to 22.

UTAH STATE MEDICAL ASSOCIATION Annual Scientific Session, September 5 to 7, Hotel Utah, Salt Lake City, Utah. *Contact:* Harold Bowman, 42 South Fifth Street, Salt Lake City.

SAINT JOHN'S HOSPITAL Annual Postgraduate Assembly, September 12 to 14, Saint John's Hospital, Santa Monica. *Contact:* John C. Eagan, M.D., director, Postgraduate Assembly, 22nd Street at Santa Monica Blvd., Santa Monica.

WASHINGTON STATE MEDICAL ASSOCIATION Annual Meeting, Olympic Hotel, Seattle, Washington, September 15 to 18. *Contact:* Mr. Ralph W. Neill, executive secretary, 1309 Seventh Ave., Seattle, Washington.

SAN DIEGO COUNTY GENERAL HOSPITAL 11th Annual Postgraduate Assembly, September 18 to 19. Reception for all registrants, 5:00 to 7:00 p.m., September 18. *Contact:* Haddon A. Peck, Jr., M.D., 525 Hawthorne St., San Diego.

NEVADA STATE MEDICAL ASSOCIATION Annual Meeting, Las Vegas, September 25 to 28. *Contact:* Nelson B. Neff, executive secretary, P. O. Box 188, Reno.

SAN FRANCISCO HEART ASSOCIATION 28th Annual Postgraduate Symposium on Heart Disease, October 2 to 4, St. Francis Hotel, San Francisco. *Contact:* Lawrence I. Kramer, Jr., executive director, 604 Mission St., San Francisco.

FIRST WESTERN INDUSTRIAL HEALTH CONFERENCE, Biltmore Hotel, Los Angeles, October 4 to 6. *Contact:* E. J. Zaik, M.D., secretary, Western Industrial Medical Association, 740 South Olive Street, Los Angeles 14.

SAN DIEGO COUNTY HEART ASSOCIATION Seventh Annual Professional Symposium on Heart Disease. U. S. Naval Hospital, San Diego, October 8. *Contact:* O. Martin Avison, executive director, San Diego County Heart Association, 1651 Fourth Ave., San Diego.

LOS ANGELES COUNTY HEART ASSOCIATION 27th Annual Symposium on Heart Disease, Wilshire-Ebell Theatre, 4401 W. Eighth St., Los Angeles, October 9-10. *Contact:* Walter S. Thompson, Jr., M.D., chairman, 660 S. Western Ave., Los Angeles.

CALIFORNIA SOCIETY OF INTERNAL MEDICINE Annual Meeting, October 25 to 27, El Mirador, Palm Springs. *Contact:* Mrs. Mildred B. Coleman, assistant secretary, 350 Post St., San Francisco 8.

CALIFORNIA ACADEMY OF GENERAL PRACTICE Ninth Annual Scientific Assembly, November 3 to 6, Hotel Statler, Los Angeles. *Contact:* William W. Rogers, executive secretary, 461 Market Street, San Francisco.

*NOTE: In regard to the dates of oral examinations, applicants are requested NOT to arrange to come to an oral examination until they receive a notice of the action of the Credentials Committee advising them of the time and place to appear.



THE PHYSICIAN'S *Bookshelf*

PRACTICAL PEDIATRIC DERMATOLOGY—Morris Lelder, M.D., Associate Professor of Dermatology, New York University Post-Graduate Medical School. The C. V. Mosby Company, St. Louis, 1956. 433 pages, \$10.50.

This book is an excellent and recommended review of the subject of pediatric dermatology. It comes doubly welcome because there are very few books in this specialized, though very commonly encountered, field.

There is an elementary, but excellently written and lucid consideration of skin anatomy, physiology, and pathology in 21 pages, including a useful dermatohistopathologic glossary. The chapter on principles of dermatologic diagnosis includes many useful tables on differential diagnostic points. Therapy is particularly excellently treated, including a fine section on exactly how dressings should be applied. There follows a section printed on blue paper (for easy reference) of 101 most useful dermatologic preparations. The remainder of the book is devoted to a systematic consideration of dermatoses arranged etiologically.

The book is written with a clear, concise style not devoid of humor. The material is excellently organized, almost all chapters containing tables into which a great amount of material is clearly presented. Especially good among the 41 tables are those classifying dermatoses by system involved—nails, oral mucosa, panniculus adiposus, sebaceous glands and sweat glands. The 115 photographs and drawings are well chosen, instructive and clear. The table of contents is fair. The index is very good. The type is very readable. The paper, with the unfortunate exception of the blue pages on therapy, is of very good quality.

On the distaff side, it is unfortunate that a book which considers hapalonychia, glossitis rhomboidea mediana, and folliculitis ulerythematosus reticulata does not include descriptions or illustrations of measles, chickenpox, roseola, or rubella. Fleabites, not always so easy to diagnose, are dismissed with two sentences. The important fact that insect bites may elicit bullous reactions in children instead of the usual wheals and papules, is not mentioned. The section on allergic mechanisms could have been more complete. Unguis incarnatus is incorrectly referred to as "unguim (genitive plural) incarnatus." Regrettably, no references are given at all for further reading. The author declared his intention to avoid an exhaustive bibliography, but would not a pinpointing of selected key articles be even better, and certainly better than no references at all?

These are, however, relatively minor drawbacks, and should not detract from the sound, practical approach to dermatology so beautifully presented. Although it contains little which is completely new to the dermatologist, the organization and classification of so much material in so little space should put the book in great demand with dermatologists. Because it contains so much valuable material which would be completely new to pediatricians and general practitioners, it will be of inestimable value in these circles.

DISEASES IN INFANCY AND CHILDHOOD—Second Edition—Richard W. B. Ellis, O.B.E., M.A., M.D., F.R.C.P., Professor of Child Life and Health, University of Edinburgh, E. & S. Livingston, Ltd., Edinburgh—Distributed in U. S. by The Williams and Wilkins Company, Baltimore, 1956. 710 pages, \$10.00.

This volume by the Professor of Child Life and Health of the University of Edinburgh is a general pediatric text intended for the medical student, pediatrician and general practitioner. The first edition appeared in 1951 and this is the first printing of the revised second edition. The book is well printed and profusely illustrated. Its chapters on congenital malformations, constitutional factors and prenatal infections are interesting and in general up to date. However, the reader may be disappointed in the approach suggested in certain sections as this reviewer was with the author's treatment of the subject of allergy and of adrenal cortical hyperplasia.

References, though not numerous, cover recent literature fairly well, especially those of British origin.

This volume can be better recommended as a supplementary text on pediatrics than as the sole pediatric reference for one's library.

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DERMATOLOGY—Donald M. Pillsbury, M.A., D.Sc. (Hon.), M.D., Professor and Director, Department of Dermatology; Walter B. Shelley, M.D., Ph.D., Associate Professor of Dermatology; and Albert M. Kligman, M.D., Ph.D., Associate Professor of Dermatology, all from the University of Pennsylvania School of Medicine. W. B. Saunders Company, Philadelphia, 1956. 1331 pages, 564 figures, \$20.00.

The arrival of this new textbook in the field of dermatology is a refreshing and stimulating event.

The authors have broken sharply from the traditional revision and repetition of other editions and texts which have cluttered so many medical textbooks in the past.

In writing this book, the basic sciences, particularly skin physiology, have been stressed, and we find the result truly rewarding.

Dermatologic terminology has been revised and simplified; only the "preferred" methods of therapy have been stated. The photographs and diagrams are extremely well chosen and at times humorous. The normal functions of the skin as an organ are stressed throughout.

Many readers will find the sections on skin allergy and hypersensitivity and industrial dermatoses particularly valuable.

The dermatologist reader will undoubtedly note the absence of complete lists of references. The chapters include only one or a few key references to the subject matter.

It is felt that nonspecialists, as well as dermatologists, students, as well as teachers, will welcome this clarifying textbook of the skin to what is often regarded as a somewhat cumbersome and perhaps confusing field of medical literature. This text represents one of the finest contributions to the field of dermatology in the past twenty-five years.

CLINICAL ROENTGENOLOGY—Volume IV—The Digestive Tract, the Gall Bladder, Liver and Pancreas, the Excretory Tract and Special Studies Emphasizing Differential Considerations—Alfred A. de Lorimier, M.D., Radiologist, St. Francis Memorial Hospital, San Francisco; Henry G. Moehring, M.D., Radiologist, Duluth Clinic, Duluth, Minnesota; and John R. Hannan, M.D., Radiologist, Cleveland, Ohio. Charles C. Thomas, Publisher, Springfield, Ill., 1956. 676 pages, \$24.50.

The Fourth Volume of this excellent series covers not only the subjects mentioned in the title, but also obstetrical roentgenology.

As in the previous volumes, the reproductions of roentgenograms are in the same tone as the originals, and labeling is satisfactory. More important, every effort has been made to index the subjects in such a way that differential diagnosis is made more simple. Further helps are the addition of clinical and laboratory findings which complete the pictures of the disease processes under discussion.

It is a book which should be useful not only to radiologists, but to any doctors whose interest might lie in the fields which it encompasses.

* * *

NEW GOULD MEDICAL DICTIONARY—Second Edition—Edited by Norman L. Hoerr, M.D., Arthur Osol, Ph.D., with 88 contributors. The Blakiston Division, McGraw-Hill Book Company, Inc., New York, 1956. 1463 pages, \$11.50.

The editors of this revised edition of what has become a classic work in its class have modernized the book throughout with 12,000 new definitions and 8,000 changes. These are predominantly in the areas of chest surgery, psychiatry, cancer, definitions on blood groups, antiarthritic compounds, veterinary medicine, dentistry, nuclear science and aviation medicine. At present this book contains more terms from today's live medical language than in any other dictionary. Moreover, in addition there is a special section of illustrations, and a section of important tables, which are helpful features, yet retain the optimum size for a book of this type. The list of distinguished specialist contributors make this a most authoritative text which is recommended to student and practitioner.

* * *

THE YEAR BOOK OF OBSTETRICS AND GYNECOLOGY—1956-1957—J. P. Greenhill, B.S., M.D., F.A.C.S., F.I.C.S. (Honorary), Professor of Gynecology, Cook County Graduate School of Medicine, Editor. The Year Book Publishers, Incorporated, 200 East Illinois St., Chicago, 1956. 592 pages, 82 illustrations, \$6.75.

The 1956-1957 Yearbook of Obstetrics and Gynecology follows the familiar pattern of its previous editions. The editor has done an excellent job in culling through the world literature and, in a clear and concise manner, compressing the most interesting and informative material into a single 592 page volume. The subject matter is arranged in an orderly fashion beginning with the earliest fertilized ovum reported during the year and progressing through the various phases of obstetrics, gynecology and related clinical conditions.

The obstetrical portion includes sections on pregnancy tests, abortion, cardiac disease and cardiac surgery in pregnancy, diabetes and the prediabetic syndrome of pregnancy, toxemias, management of labor including anesthesia, and bleeding complications of pregnancy. This is followed by an orderly review of gynecological literature. Interspersed at frequent intervals in both sections the editor has added comments from other pertinent articles related to those immediately preceding.

This yearbook should find a useful place in the library of anyone interested in obstetrics and gynecology. It will prove most helpful to the busy and sometimes isolated practitioner who doesn't have time or recourse to the many jour-

nals reviewed. Its greatest usefulness will be for those readers interested in a ready reference guide to the original papers.

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PELVIMETRY—Herbert Thoms, M.D., Emeritus Professor of Obstetrics and Gynecology, Yale University School of Medicine. Paul B. Hoeber, Inc., Medical Book Department of Harper & Brothers, 49 East 33rd Street, New York 16, N. Y., 1956. 120 pages, \$5.00.

"The purpose of this book is to place before practitioners of obstetrics a practical description of variations and abnormalities of the bony pelvis in relation to labor and to describe certain diagnostic procedures by which pelvic morphology and pelvic capacity can be ascertained." The book achieves its purpose very well. The author has devoted many years to the study of the human pelvis and is well renowned for having developed a method of x-ray pelvimetry. Dr. Thoms strongly espouses routine x-ray pelvimetry for all primigravid women, feeling that the knowledge so gained has resulted in a lessened incidence of trial labor, a lowered incidence of difficult and traumatic forceps operations, a diminution in the fetal mortality in primigravids with breech presentations, and a decrease in the incidence of cesarean section in cases of unengaged head in primigravid women where palpatory examination alone suggested disproportion.

The variations in the shape of the pelvic inlet revealed by routine x-ray pelvimetry over a twenty-five year period are described. The variations are related to developmental factors (to which a whole interesting chapter is devoted), to the hormonal changes occurring at puberty, and to nutrition. Dr. Thoms suggests that the slightly flattened oval inlet, which has been considered characteristic of the female, may actually be due to abnormal influences (often nutritional). He shows that well-nourished young women, as represented by student nurses, have a much higher incidence of pelves of the dolichopelvic type (oval, with the anteroposterior diameter of the inlet exceeding the greatest transverse) than do women applying for clinic maternity care in New Haven.

The inaccuracy of palpatory measurements, except for the determination of the anteroposterior and the transverse diameters of the outlet is remarked. The important pelvic dimensions and the methods for their determination are described. It is emphasized that the most significant information to be determined relates to pelvic capacity. If the diameters are large enough, the fetus will pass through a pelvis of almost any shape.

Pelvic midplane contraction is described, and said to be present in about sixteen per cent of the cases. When the distance between the ischial spines is less than 10 cm., Dr. Thoms regards it as "contracted." If midplane contraction is combined with shortening of the anteroposterior diameter of the outlet, operative delivery must be anticipated in over half the cases.

A short chapter deals with pelvic outlet contraction.

Pelvic roentgenometry as developed by Dr. Thoms is described in some detail. Emphasis is placed upon the lateral film.

Several chapters are devoted to pelvic abnormalities caused by diseases, the most notable being the rachitic and osteomalacic pelves. Included are the assimilation pelvis, spondylolisthetic, Naegle, kyphotic, scoliotic and coxalgic pelves.

This is a very excellent little volume of some 115 pages written by one of the outstanding authorities on the human pelvis. Not all physicians practicing obstetrics will agree that x-ray pelvimetry is indicated in every primigravid woman. Other than this there can be no quarrel whatever with the information which Dr. Thoms so concisely puts before us.